Volume 3, Number 6 $3.50

Scholastic's Magazine for Today's Elementary Classrooms

TEACHING and computers

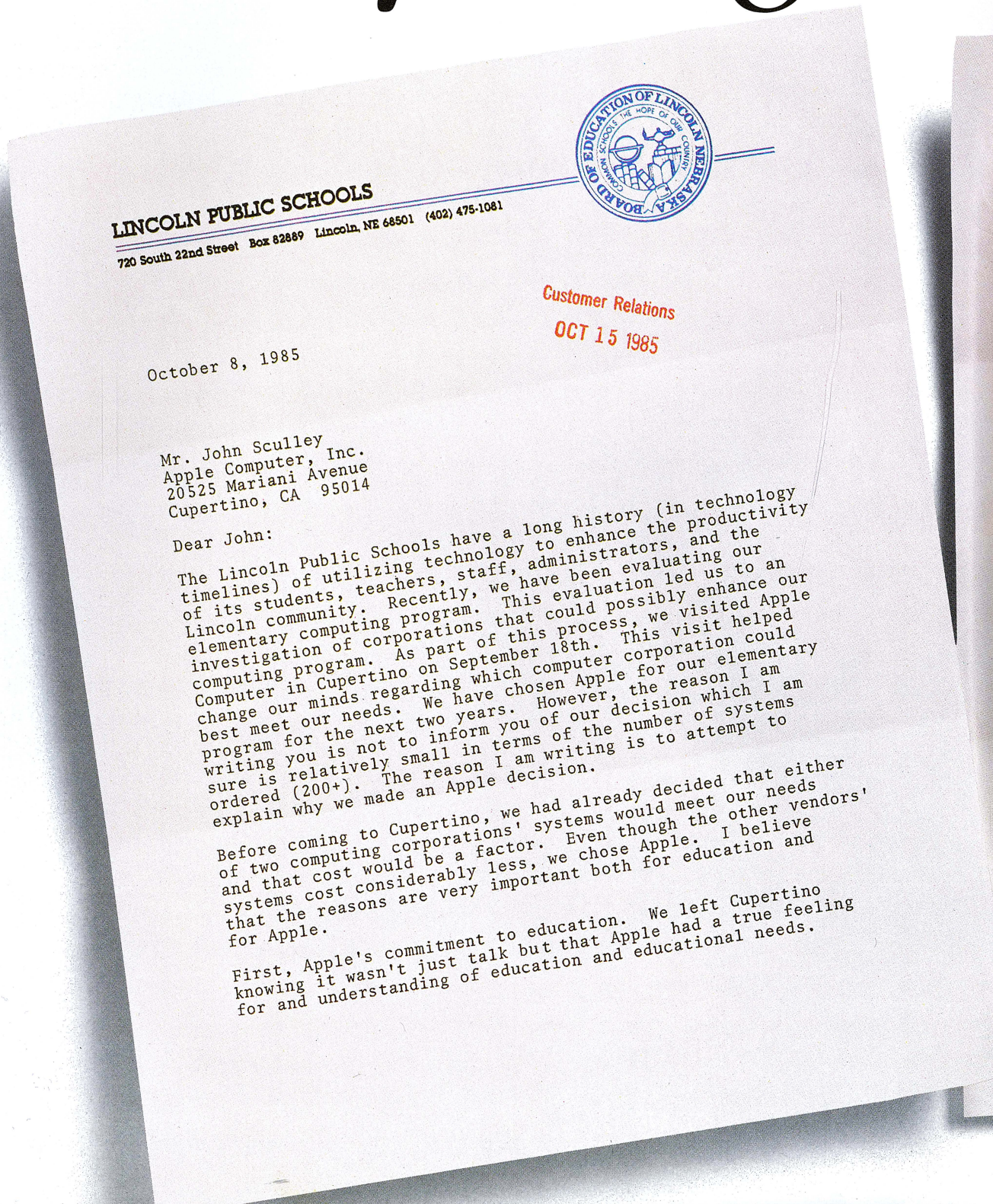
Published by Scholastic Inc. March 1986

SCIENCE SIMULATION:

WHERE HAVE ALL THE WHALES GONE?

VOCABULARY BOOSTERS
LOGO MUSIC ACTIVITIES

When you live in a t
you've got t



LINCOLN PUBLIC SCHOOLS
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BOARD OF EDUCATION OF LINCOLN NEBRASKA
COMMON SCHOOLS THE HOPE OF OUR COUNTRY

Customer Relations
OCT 15 1985

October 8, 1985

Mr. John Sculley
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014

Dear John:

The Lincoln Public Schools have a long history (in technology timelines) of utilizing technology to enhance the productivity of its students, teachers, staff, administrators, and the Lincoln community. Recently, we have been evaluating our elementary computing program. This evaluation led us to an investigation of corporations that could possibly enhance our computing program. As part of this process, we visited Apple Computer in Cupertino on September 18th. This visit helped change our minds regarding which computer corporation could best meet our needs. We have chosen Apple for our elementary program for the next two years. However, the reason I am writing you is not to inform you of our decision which I am sure is relatively small in terms of the number of systems ordered (200+). The reason I am writing is to attempt to explain why we made an Apple decision.

Before coming to Cupertino, we had already decided that either of two computing corporations' systems would meet our needs and that cost would be a factor. Even though the other vendors' systems cost considerably less, we chose Apple. I believe that the reasons are very important both for education and for Apple.

First, Apple's commitment to education. We left Cupertino knowing it wasn't just talk but that Apple had a true feeling for and understanding of education and educational needs.

own named Lincoln, o be honest.

Second, was the honesty of Apple in not making promises or commitments which were not currently reality or even near-reality. What we don't need in educational technology today are promises that sell equipment but don't meet expectations and address true needs. Third, and most importantly, are the people at Apple. They embody the previous two reasons. Sue Talley provided us with information regarding Apple's commitment to education along with Jim Buckley, Betsy Pace, Mike Homer, Mike Leibhold, Jessica Prince, and Sue Gold. Randy Jennings and Dave Newton from our region were instrumental in setting up our executive visit. These people and others like them at Apple are the real reason we made an Apple decision.

Again, I would like to thank Apple Computer for its hospitality during our visit to Cupertino and would extend an invitation to you to visit Lincoln and see our programs, projects, and activities. We are very proud of our district's commitment to the utilization of technology in meeting our present and future goals.

Sincerely,

Tom Burnett

Tom Burnett

Assistant Superintendent
for Technology

We'll tell you the truth.

It's not every day our company gets a letter that sums up its special relationship with education in two pages.

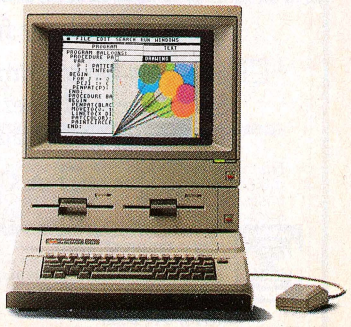
That's why, unaccustomed as we are to airing our mail out in public, we've decided to reprint the letter you see here.

We think it says, most importantly, that our people have the ability to really listen; to help you develop reliable computer systems with which your schools can live and grow.

We think it shows that the partnership we have with educators is real. Which is why, after eight years of being in school, there are now more Apple computers in classrooms than all other brands combined.

One last thing: if your school chooses Apple, we'll work to make you every bit as satisfied as the folks up in Lincoln.

Honest.



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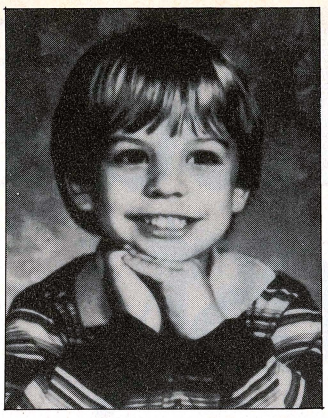
In Canada, call **(800) 268-7796** or **(800) 268-7637.**

HAVE YOU SEEN THIS CHILD?

Thomas Bryan Thompson

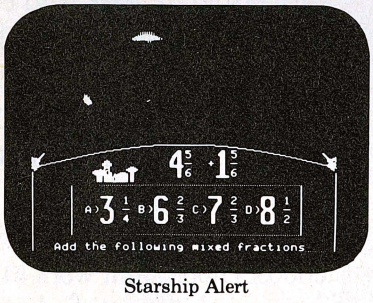
Born: October 2, 1973
Missing From: Lawrence, OH
Missing Since: April 12, 1979
Eyes: Blue **Hair:** Blond

If you have information on the whereabouts of Thomas (case #1853), or if you suspect another child of being a victim of abduction, please contact CHILD FIND, INC. P.O. BOX 277, New Paltz, NY 12561; 800/426-5678. All information will be handled in strict confidence.



Two Great New Ideas From Opportunities For Learning!

The Wizard has arrived, and he's brought five exciting math programs for your classroom! Each features sharp-looking graphics, sound effects, and record keeping for 250 students, and are available for Apple and Commodore 64. Titles include:



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- Think Tank 2
- Starship Alert
- Fraction Tutorial
- Space Equations

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EDITORIAL

Offices: 730 Broadway, New York, NY 10003
Editor: Mary Dalheim
Associate Editors:
Lorraine Hopping, Lesli Rotenberg, Jackie Glasthal
Production Editor: Kristan Meyer
Contributing Editors:
Sandra Markle, Shiela Swett
Art Editor: Shelley LaRoche
Graphic Artist: Suzanne Sullivan
Editorial Design Director: Dale Moyer

Editorial Director, *Teaching and Computers; Electronic Learning:* Jack L. Roberts

PUBLISHING/ADVERTISING

Associate Publisher: Robert Burroughs
Eastern Representative: Eileen Berk
New York Office: 730 Broadway, New York, NY 10003, (212) 505-3478
Midwest Manager: Ray Barnes
Midwestern Representative: Brian Barnhart
Chicago Office: 400 N. Michigan Ave., Chicago, IL 60611, (312) 467-6888
West Coast Office: John Sabo, John Sabo Associates, P.O. Box 3085, Redondo Beach, CA 90277, (213) 379-8455
Director, Advertising Production:
Gay Siccardi
Advertising Production Coordinator:
Renee Torres
Special Projects Manager:
Corona Gray-Moore, (212) 505-3485

SCHOLASTIC MAGAZINE GROUP

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J. G. Brownell
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Vice President, Advertising:
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PROGRAMMING CONSULTANTS: William Kraus, Emile Gardette.

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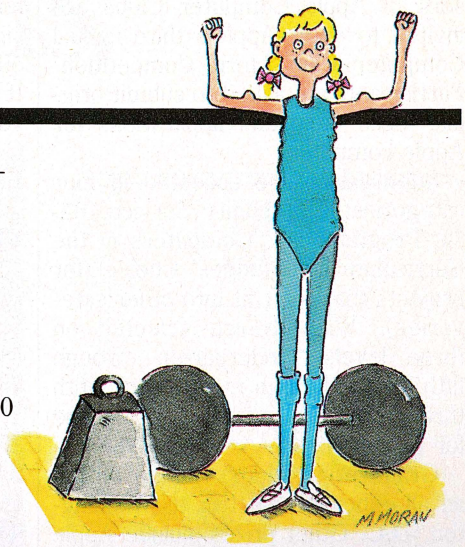

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Ahoy, Captain Ahab! When kids participate in this computer simulation of a 19th century whale hunt, they'll learn the importance of balancing the needs of humans with those of the animal kingdom.

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Sing along with the turtle in this fine arts teaching unit. All you need is a Commodore or Terrapin version of Logo and you can use the *computer* to teach music!

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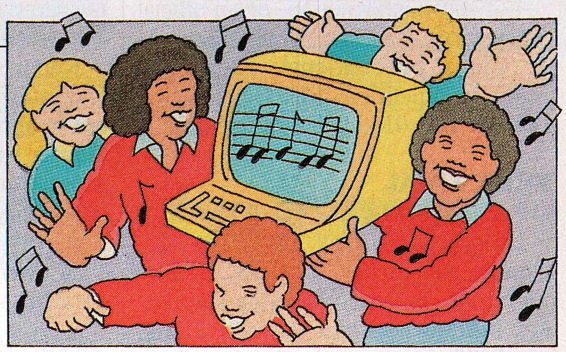

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UPDATE

NEWS FOR COMPUTER-USING TEACHERS

APPLE COMPUTER CLUB COMPETITION

Student members and adult advisors of Apple Computer Clubs are invited to enter Apple's third annual Computer Club Merit Competition. Participants are asked to submit original ideas on useful applications for Apple computers.

Submissions are accepted in four categories: Community Service, BASIC Programming, Computers in the Curriculum, and Judges' Choice (for projects that don't fit into other categories). Winners are selected on three levels: kindergarten through fifth, sixth through eighth, and ninth through twelfth grade. The deadline for submissions is April 15, 1986.

Grand prize winners are awarded an all-expense paid trip to Washington, D.C. Other prizes include Apple IIc systems, software, t-shirts, and iron-on patches. Winners will be announced in May.

For more information, or an official entry form, write to: Apple Computer Clubs International, Att: 1986 Merit Competition, 217 Jackson St., Lowell, MA 01853; 800/343-1425.

FREE TRIAL OF COMPUTERIZED ATLAS

Boxes of Maxell diskettes designed for either IBM-PC, PCjr, McIntosh, or Apple II series computers include a bonus through March 31, 1986: a copy of the software program *Concepts Computerized Atlas.*

With a color graphics board, color monitor, and 128K of memory, you can trial-run this computerized atlas three times (40 minutes each time) before the program locks. If you wish to purchase the software ($69.95) after the three-trial use, you can do so by calling a toll-free number and charging the cost of the program to one of your major credit card numbers. You'll then receive a computer code that unlocks the program.

If you do not purchase the software, you can still use the disk as a blank (a bonus value of $6.50).

The computerized atlas provides such facts as the capital, population, language, and currency of every country in the world. It also contains information about more than 2,500 cities worldwide.

At a cost of $5 for an IBM or $6.95 for an Apple version, you can order a single trial copy of the program without buying a box of Maxell diskettes. If you buy the software, the amount you have already paid is deducted. Contact: Software Concepts, P.O. Box 3323, Wallingford,CT 06494.

VDTs ARE SAFE

There is no evidence of a link between birth defects and the use of video display terminals (VDTs). Nor is there evidence that VDT use damages the eyes or skin of operators.

These are the findings of a panel of 15 scientists summoned to Geneva, Switzerland, recently for a World Health Organization (WHO) meeting. The conclusions were drawn after studying 12 groups of health cases filed by pregnant women and new mothers who claimed VDTs caused miscarriages, premature births, and birth defects.

Reports released by other national and international health organizations are in agreement with the findings. A House subcommittee on health and safety concluded that "the overwhelming body of scientific knowledge at this point strongly suggests that there are no problems with regard to radiation exposure to VDTs."

FREE AND INEXPENSIVE NASA RESOURCES

Up-to-date aerospace information is at your disposal for the cost of materials reproduction and mailing, thanks to teacher resource centers established by the National Aeronautics and Space Administration (NASA).

The centers house videotapes, films, slides, publications, audio cassettes, computer software, laser discs, and teacher guides on NASA research and technology. Subject areas covered by the materials include earth resources, mathematics, technology utilization, and space science.

To obtain the use of these materials, or to have a regional teacher resource center set up in your area, contact the center nearest you.

Main resource centers are: **Alabama:** 205/837-3400, ext. 36; **California:** 415/694-6077 or 818/354-6916; **Florida:** 305/867-4090 or 9383; **Maryland:** 301/344-8981; **Mississippi:** 601/688-3338; **Ohio:** 216/267-1187; **Texas:** 713/483-3455 or 4433; and **Virginia:** 804/865-4468.

Regional teacher resource centers already set up are: **Museum of Science and Industry, Chicago, IL:** 312/684-1414, ext. 432; **University of Evansville, Evansville, IN:** 812/479-2766; **Oakland University, Rochester, MI:** 313/370-3079; **Mankato State University, Mankato, MN:** 507/389-1516; **St Cloud State University, St Cloud, MN:** 612/255-2062; **University of Pittsburgh, Pittsburg, PA:** 412/624-5211; **Science, Economics & Technology Center, Milwaukee, WI:** 414/765-9966; **University of Wisconsin at LaCrosse, LaCrosse, WI:** 608/785-8128.

SCHOOL SUPPLIES BULLETIN BOARD

BidNet is a service that makes it possible for nonprofit organizations, such as school districts, to enter electronic "bid requests" into its network at no cost.

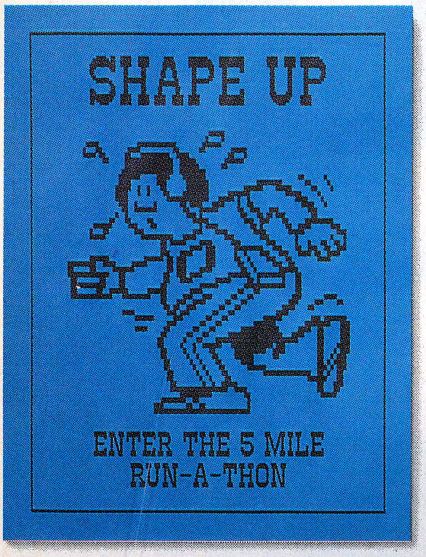
Requests for goods and services are accepted in almost any area except construction. Cleaning abrasives, computers, live frogs, and food services, have all been listed on the electronic board.

A school district does not need a computer to participate. Requests are simply submitted in writing on special forms provided by BidNet. BidNet then enters the information into its system.

More than 1,000 vendors pay the annual fee allowing them access to your requests. Your organization receives a monthly statement showing which firms have shown an interest in your needs. It's then up to you and the vendors to make contact. BidNet stays out of business transactions.

For more information, contact BidNet, 5 Choke Cherry Rd., Rockville, MD 20850; 800/447-5837. ■

BET YOU NEVER PICTURED THE PRINT SHOP™ DOING THIS.



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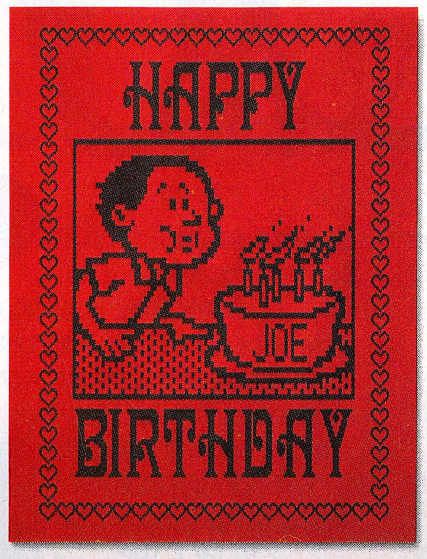
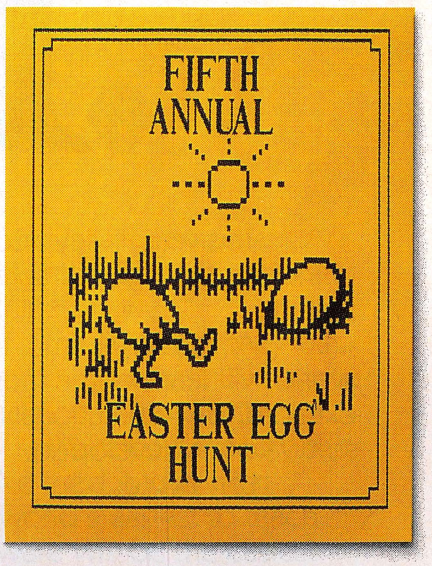


The Graphics Expander™ has powerful drawing and editing tools to easily modify and customize any graphic.



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Use these graphics exactly as they appear to give your Print Shop creations a refreshing, unique look. Or, have fun customizing the graphics to make each one perfect for the occasion. With the Graphics Expander you can easily add a specific number of candles to a birthday cake or put the coach's name right on a football.

It's easy because the Graphics Expander provides powerful drawing and editing tools

that work just as well with graphics from The Print Shop or The Print Shop Graphics Library.™ You can select from a variety of drawing pens, fill patterns, automatic lines, circles or boxes. Flip graphics left to right or magnify them for detail work. The tools are fun to use and make it easy to personalize your Print Shop creations.

Futhermore, the Graphics Expander allows you to make Print Shop graphics out of your favorite computer pictures from any source such as a Koala Pad™ or digitizer. Any portion of a standard high resolution picture can now be part of your banners, signs and greeting cards.

With The Graphics Expander Volume 1, not only do you have access to over 300 wonderful new graphics, but with the drawing and editing tools, you have access to your imagination. Picture that!

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Available for the Apple II+, IIe, IIc. IBM and Commodore versions are coming soon.
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Computer Fiction

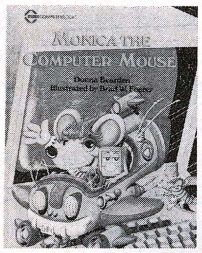
BY CANDY COLBORN

Sometimes computer concepts that are not easily grasped through direct instruction can become clear to a student if they are expressed through means of a story. Here are some computer fiction books that can do just that. They are also plain "good reading"!

LAKE FEAR
THE LOST FOREST

In each of Ian McMahan's latest books, the youthful hero Ricky Foster and his robotic sidekick, ALEC (Access Linkage to Electronic Computer), return for new adventures. In ***Lake Fear*** (Macmillan; 1985; $11.95), Ricky and his friend Jason search for the cause of a rash afflicting children in their town. With ALEC's help they solve the mystery, but not until the boys run afoul of a gang of bullies, uncover computer fraud, and expose a scheme to sell illegal fireworks. In ***The Lost Forest*** (Macmillan; 1985; $11.95), Ricky is left alone at home when his mom, a wildlife photographer, is on a field trip in the wilderness and his father, a science researcher, is called to Washington, D.C. While they're away, Ricky discovers that his mother's office has been burglarized. Could she be in danger? He goes to the forest, and with ALEC's help, traces her path. When he finds her, it is only to discover that they have both become prisoners in a secluded log cabin. Mother and son escape and even apprehend their culprit, but not before some tricky computer work has been done. Both of these adventures are fast-paced, and the need to keep ALEC's existence a secret lends to the tension of each. Use of the computer in each story has the added advantage of giving youngsters a glimpse at computer functions that go beyond video games and word processors. Both books are recommended for grades four through seven. Readers who enjoyed McMahan's first two adventures, *The Great Gradepoint Mystery* and *The Fox's Lair,* will be standing in line for these.

MONICA
THE COMPUTER MOUSE



For primary school children, I recommend Donna Bearden's ***Monica the Computer Mouse*** (Sybex Computer Books; 1984; $5.95), a picture book designed for ages five through eight (illustrations by Brad W. Foster). Monica is a mouse who wants to be a computer. One night a mysterious voice promises to help make her dream come true. A creature named Chip (yes, he looks like one) is assigned to help. Chip shows Monica different types of computers and explains to her how they are put to use throughout the city. They visit a grocery store, a home, an urban traffic center, a National Forest Service office, a hospital, and a school. Custer, a little green "bug," sneaks along to try and mess up the computer programs at each place they visit. Readers are thus taught, in a humorous way, about the damage bugs are capable of. In the end Monica realizes that she'd rather control a computer than be one. A computer can only do what a programmer tells it to, she learns. Chip brings Monica her own mouse-sized computer the next morning, presumably provided by that same power that appeared at the beginning of the book. Adults may be unsettled by the lack of explanation for all this magic, but it won't bother children one bit. The descriptions of computer uses and the large, brightly colored pictures will catch their attention and keep youngsters amused for hours.

THE MINERVA PROGRAM

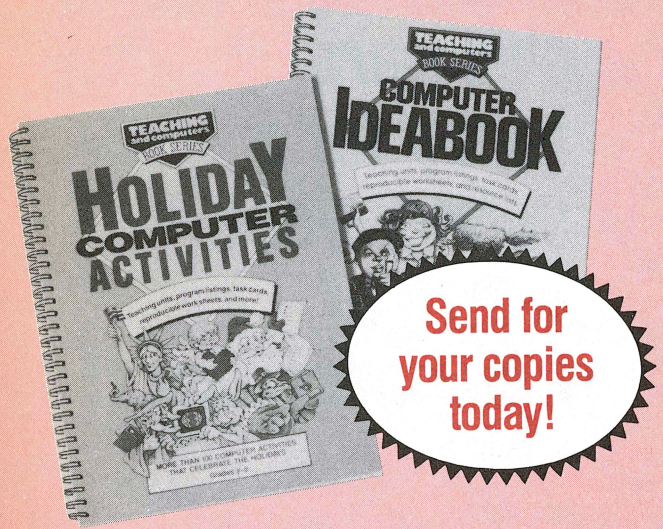
The Minerva Program (James Lorimer & Co; 1984; $12.95 cloth; $5.95 paperback), by Claire Mackay, is another adventure for young readers. This one is about a klutzy seventh grader named Minerva, who, among other burdens, is usually left in charge of her brother James, a fiesty nine-year-old who thinks he's Spiderman. "Just once in my life I'd like to be out in front," Minerva thinks to herself. But then she is selected to participate in the school's first computer class, and it doesn't take long for her to master the basics of BASIC programming. When report cards are passed out, Minerva's P.E. grade has been changed. Minerva must have altered it herself, the principal assumes. Her punishment: banishment from the computer room. In a scheme that involves some friends, as well as her brother's Spiderman talents, Minerva clears herself and exposes the real culprit, the principal's nephew, who had been collecting $6,000 a month through a false name he inserted into the school's payroll program. It turns out he plotted Minerva's banishment from the computer room so that she wouldn't discover his embezzling. Characters, including Minerva's parents, are well developed in *The Minerva Program,* and the action is fast-paced. *The Minerva Program* is a welcome addition to the ranks of computer fiction.

PUBLISHERS' ADDRESSES

James Lorimer & Co., 35 Britain St., Toronto, Ontario M5A 1R7.
Macmillan Publishing Co., 866 Third Ave., New York, NY 10022.
Sybex Computer Books, 2344 Sixth St., Berkeley, CA 94710. ■

Candy Colborn is a media specialist at Cottonwood Creek Elementary School in Englewood, CO.

Two resource books by the editors of TEACHING and computers®



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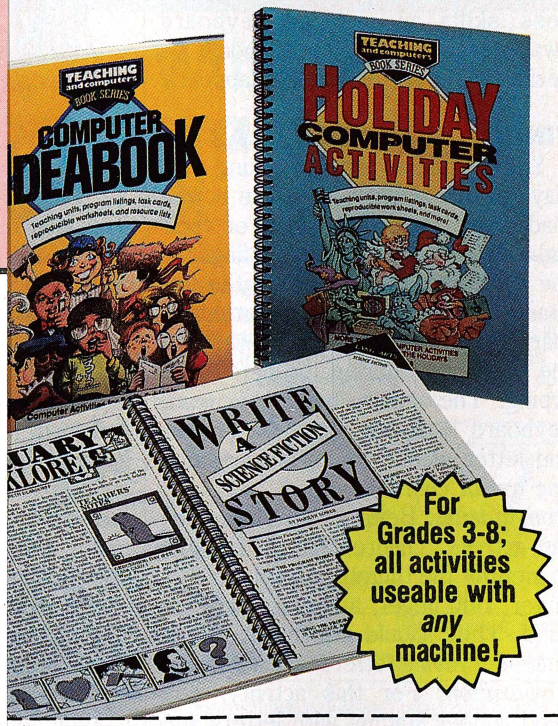

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Compu

BY CANDY COLBORN

Sometimes computer concepts that are not easily grasped through direct instruction can become clear to a student if they are expressed through means of a story. Here are some computer fiction books that can do just that. They are also plain "good reading"!

LAKE FEAR
THE LOST FOREST

In each of Ian McMahan's latest books, the youthful hero Ricky Foster and his robotic sidekick, ALEC (Access Linkage to Electronic Computer), return for new adventures. In ***Lake Fear*** (Macmillan; 1985; $11.95), Ricky and his friend Jason search for the cause of a rash afflicting children in their town. With ALEC's help they solve the mystery, but not until the boys run afoul of a gang of bullies, uncover computer fraud, and expose a scheme to sell illegal fireworks. In ***The Lost Forest*** (Macmillan; 1985; $11.95), Ricky is left alone at home when his mom, a wildlife photographer, is on a field trip in the wilderness and his father, a science researcher, is called to Washington, D.C. While they're away, Ricky discovers that his mother's office has been burglarized. Could she be in danger? He goes to the forest, and with ALEC's help, traces her path. When he finds her, it is only to discover that they have both become prisoners in a secluded log cabin. Mother and son escape and even apprehend their culprit, but not before some tricky computer work has been done. Both of these adventures are fast-paced, and the need to keep ALE
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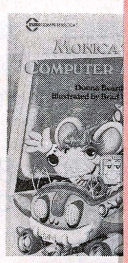

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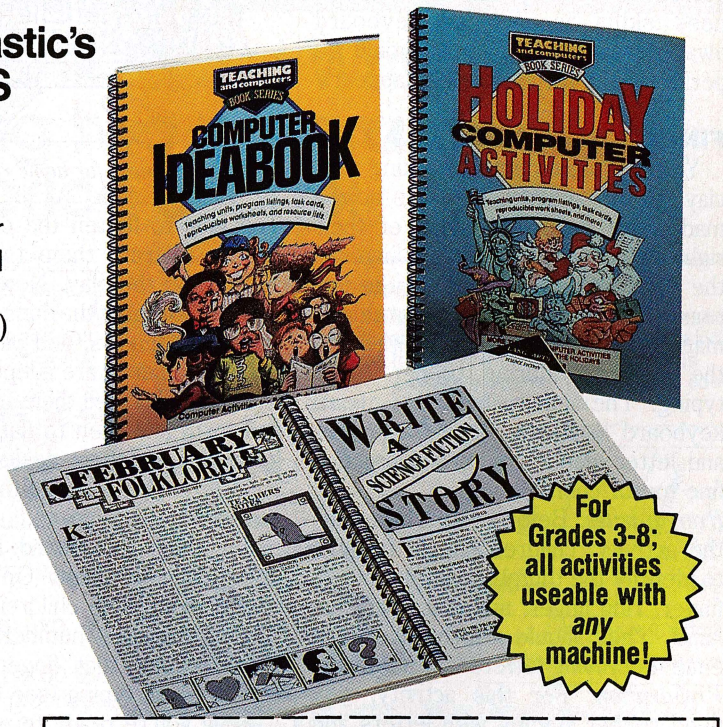

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Teaching with the Keyboard

BY TRISHA AINSA

Even before you turn it on, the computer can make a great learning tool in an early childhood classroom. That's because the keyboard has numbers, letters, and right and left sides — all helpful features for teaching basic readiness concepts. The three activities that follow (one of which does require you to turn on the computer) give you specific ways to use computers to develop important readiness skills as well as keyboard awareness. The activities should be performed in the order they appear.

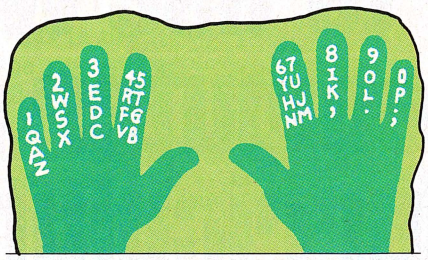
FINGER PLAY WITH CLAY

Young children enjoy working with clay. In this activity, they use homemade clay to make molds of their right and left hands. On each finger in the hand molds, they stamp the letters, numbers, and punctuation marks that that finger can press on the keyboard during proper touch typing. The activity helps kids learn keyboard locations, develop number and letter identification, and practice fine motor coordination.

Prerequisites: Before your class tries the activity, children should be able to identify the thumb, pointer, middle finger, ring finger, and pinky on each hand. They should also have experience identifying letters and numbers.

Preparation: For this activity, you need rubber stamps with letters and numbers on them (available in any stamp shop or toy store) and clay. To make your own creative clay for approximately 20 children, gather the following ingredients: 4 cups flour, 2 cups salt, food coloring (any color), 1 cup water, and 4 tablespoons vegetable oil. Pour the flour and salt into a large bowl. Stir well with a spoon. Add a drop of food coloring to the water. Then pour the water into the bowl and mix with your fingers. Add the oil and mix thoroughly.

Activity: Once the clay is ready, distribute about a fistful to each student. Use the clay for finger exercises. Ask children to try pushing it, pressing it, and pulling it with their hands.



Clay mold used for teaching touch typing.

Finger placement for home row keys.

Tell kids to flatten the clay on their desks. Instruct them to push their pointers in the clay. Now have them do the same with their middle fingers, ring fingers, and pinkies.

Once children are adept at manipulating the clay, tell them to roll it back and forth and then to flatten it like a keyboard on their desks. Help the children make prints of their hands in the clay. Print an "R" in the clay under their right hand and an "L" under their left hand. On each finger in the mold, help children stamp the keyboard letters, numbers, and other symbols that that finger can press during touch typing (see illustration).

Now you're ready to play a game. Call out random letters and numbers, one at a time. Tell children to find each number or letter on their clay fingers, and push it. Make sure kids push the finger that corresponds with the appropriate clay finger each time.

KEYBOARD PUZZLE RACE

In this activity, children assemble a keyboard puzzle. While doing so, they learn that the letters on a keyboard are not in alphabetical order. The exercise develops matching skills and eye-hand coordination, as well as keyboard location skills.

Preparation: For this activity, you need one keyboard puzzle for every two children. Wooden keyboard puzzles are commercially available, but you can make your own puzzles. For each homemade puzzle, make two identical paper keyboards and laminate them. Cut apart the keys on one board to form puzzle pieces. Use the other keyboard as the base.

Activity: To play the game, have pairs of children sit on the floor facing their puzzle. Instruct the children to remove the puzzle pieces, mix them up, and place them in front of their puzzle base. Have the pairs begin assembling their puzzles at the same time. The first pair to complete its keyboard stands up. If the puzzle is assembled correctly, that pair wins.

USING A KEYBOARD

Children are now ready to further develop coordination and keyboard awareness skills by practicing finger placement on a keyboard.

Preparation: You will need one computer per child. If there aren't enough computers for every child, let the remainder use laminated paper keyboards instead.

Activity: Teach the children how to correctly arrange their fingers on the home row keys: A S D F and J K L ; (see illustration). Tell them that their fingers always return to these keys after they have pushed other keys.

Now, call all of the keys that the left pointer presses: F G R T 4 5 B V. As you call them, tell children to push these keys with their left pointer. When they can do this alone, move on to the keys the right pointer presses: J H Y U 6 7 N M. Then teach the left middle finger's keys: D E 3 C; the right middle finger's keys: K I 8 ,; the left ring finger's keys: S W 2 X; the right ring finger's keys: L O 9 .; the left pinky's keys: A Q 1 Z; and, the right pinky's keys: ; P 0 ? /. Finally, show children how the thumb hits the space bar.

Once kids are familiar with the keyboarding activity, conduct a race to see who can push and name the keys each finger presses the fastest.

Trisha Ainsa is director of the "Computer Literacy in Children" Title VII project at the University of Texas at El Paso. ■

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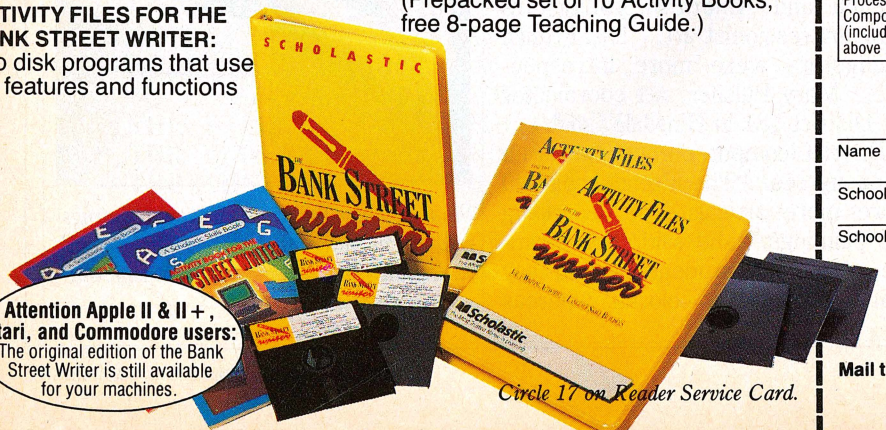

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CLASSROOM HAPPENINGS

BY LESLI ROTENBERG

Students from the Kinzie school in Chicago observe impressionist paintings on display in the Art Institute prior to setting up their data base.

LONG DISTANCE ART EXCHANGE

Art is a universal language. That's what 11- and 12-year-old students in Illinois and their peers in France discovered when they participated in a unique exchange program. The students used computers to share their observations of impressionist paintings.

The common denominator for the cultural exchange was an impressionist exhibit called "A Day in the Country." Shortly after leaving the Art Institute of Chicago, the exhibit appeared at the Grand Palais museum in Paris. The traveling exhibit gave students at Prospect and Elm schools in Hinsdale, Illinois, and students at Ecole DuVal d'Or in St. Cloud, France, a chance to share their impressions of the same paintings.

After viewing the Chicago exhibit, the U.S. children input information and observations about some of the paintings and the artists who created them into a computer data base. (See sample record on page 13.)

A few months later, the students in St. Cloud and their teacher, Mme. Annie Valverde, attended the "A Day in the Country" exhibit in Paris. Because the French and American computer hardware was not compatible, the French kids recorded their information and observations for the data base on printed forms. Then they mailed the completed forms back to Illinois. Hinsdale staff members helped the U.S. students translate the information into English and enter it into the data base. (About half the Hinsdale students study French.)

Using the Data base

The result is a comprehensive data base of information and personal interpretation regarding impressionist art. The Hinsdale students use the data base to find information about particular artists and their work.

Hinsdale students sent printouts of the entire data base and of some sample searches they did to the students in France, who have translated and used the information for similar studies.

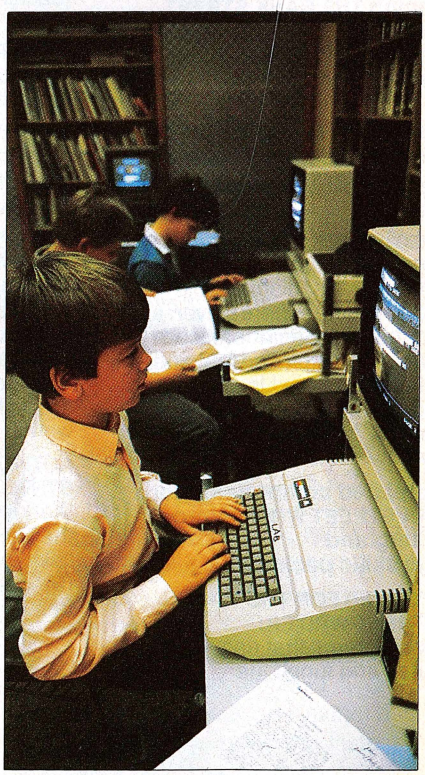
The data base also allows teachers and students to compare the way French and American youngsters view impressionist art. "The French youngsters were more introspective," Mary Pulsifer, art coordinator for District 181 in Hinsdale, said.

District computer consultant Ann Dana agrees. "The French children were more articulate in describing the paintings," she said. For example, American students would say that a painting was colorful, whereas French students often would describe the painting's colors in detail.

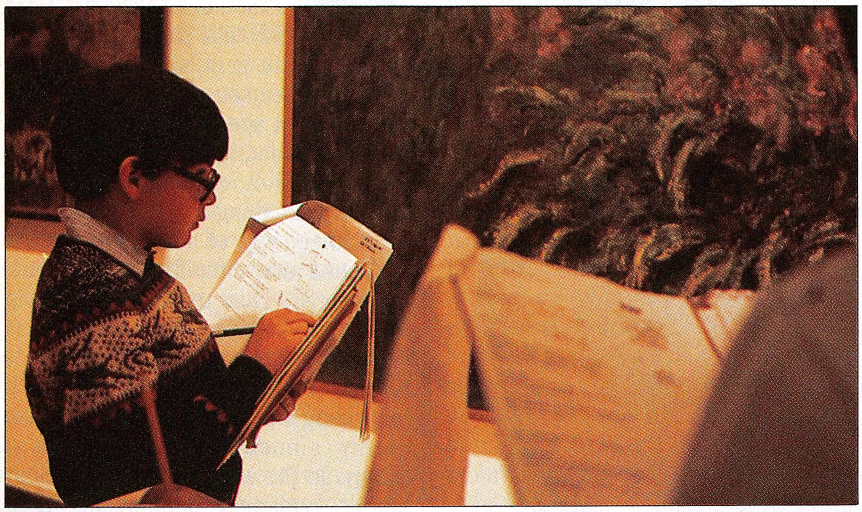
There were similarities in the French and U.S. children's observations, too. Both groups selected Claude Monet as their favorite overall painter and Gustave Caillebotte's *"Le pont de l'Europe"* (On the Europe Bridge) as one of the best liked paintings in the exhibit.

Besides sending information for the data base, the French children sent personal letters and photos of themselves. The letters, which were written in French with some English words, told about the students' families, classes, interests, and hobbies. The U.S. students responded with similar letters written in English.

The French students also wrote poems about their favorite paintings from the "A Day in the Country" exhibit. They sent the poems to the U.S. students, along with some paintings they created using some of the techniques used by impressionist artists.



Students enter information about paintings into a computer data base. French and American students exchanged the information using printouts.



A student from Hinsdale, IL, records his observations of impressionist art.

Another School Joins In

Jerie Banks, a teacher of gifted and hearing impaired students at Kinzie school in Chicago, heard about the exchange project and contacted Mary Pulsifer.

Before long, the Kinzie students became involved. The Kinzie students added their observations of impressionist paintings at the Art Institute (not on the ones in the traveling show because they were no longer in Chicago) to the computer data base. Some Hinsdale and Kinzie students worked together to create their own versions of impressionist paintings with acrylic paints on canvas. They also used a word processor to write poems about their favorite paintings and painters.

Student Artwork on Display

The culminating activity was a special exhibit of student artwork and poetry called "The French Influence" that was displayed at the Art Institute's Junior Museum for a month. Of the 22 paintings on display, seven were done by Hinsdale students; nine by students from St. Cloud, France; and six by students at Chicago's Kinzie School.

The paintings are testimony to the power of art — a means of communication that can overcome language, cultural, and physical barriers.

For more information on the exchange project, contact Ann Dana, Computer Consultant, District 181, Hinsdale, Illinois; 312/887-1370. ■

DATA BASE ON IMPRESSIONIST ART

ARTIST: CAMILLE PISSARRO
TITLE: "THE PLACE DU HAVRE, PARIS"
TOPIC: THE URBAN LANDSCAPE **DATE:** 1893
LOCATION: BOTTOM, RIGHT CORNER **GALLERY #:** 7
OBSERVER: SANDY REDLICH **DATE:** 3/14
AGE: 11 **F/M:** F **SCHOOL:** ELM
MY VIEWS OF THIS ARTWORK
THIS WORD DESCRIBES THE PAINTING: BUSY
THIS IS WHAT I SAW: LOTS OF PEOPLE RUSHING EVERYWHERE
THE PAINTING MAKES ME THINK OF: CHRISTMAS SHOPPING

Sample of a completed record from art data base.

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BY TIM ERICKSON

WHERE HAVE ALL THE WHALES GONE?

Extinction is forever. Once the last plant or animal of its kind has died, we never see that species again. How does a species become extinct? When is extinction natural? And when is it the fault of humans? Why do humans do things that result in the permanent loss of some species?

These are difficult and important questions. This teaching unit helps students develop some answers to these questions as they pertain to animal extinction. It does this by providing a program listing for a computer simulation called *Whaling Away*. In the simulation children learn about endangered animals (those threatened with extinction) by going on a make-believe whale hunt. The whale hunt is set in the 1800s, when whalers killed large numbers of whales in the north Atlantic Ocean.

The simulation requires only one computer. Students divide into groups of whaling vessel crews that try to make a living by hunting whales. The computer keeps track of the number of whales in the ocean, the location of each crew's vessel (at sea or on land), and the amount of money and supplies each crew has. At the end of the game, the computer displays a table that shows how the whale population has changed due to the actions of the whaling crews. It also displays a chart that shows how much money each crew has amassed by selling the whales they catch.

From the simulation, students learn that they will endanger the whale population if they try to make as much money as possible in a given time period. On the other hand, they learn that they can make a living without endangering the whale population by catching fewer whales.

Because this is a subtle lesson that is best learned through self-discovery, students should play the simulation first, and then discuss its motives and lessons.

Following is some background on endangered animals, and on the history of whale endangerment. You'll find the information especially useful during your class discussions about the whale simulation.

Graphic Media

A COMPUTER SIMULATION THAT SHOWS STUDENTS HOW ANIMALS CAN BECOME EXTINCT

HOW ANIMALS BECOME ENDANGERED

There are three main ways that animals become endangered. First, some animals become endangered *naturally*, and then gradually become extinct. In many cases, this happens because an animal cannot adapt to environmental changes, such as changes in climate or vegetation. Its numbers dwindle and the species gradually dies out. For example, one of the reasons the giant panda is now a rare species is that its diet depends heavily on bamboo, a plant that is no longer plentiful on Earth.

Second, endangerment can occur when people and other animals vie for the same space and resources. Through building, farming, and making lakes, humans change the face of the earth. This results in the destruction of *habitats* (places where animals live). If there's no place for a species to live, it dies. For example, bumblebee bats, the smallest mammals on Earth, are endangered because hydroelectric dams have flooded the caves in Thailand where they live. Similarly, Queen Alexandria's birdwings, the world's largest butterflies (found only in Papua, New Guinea), are being destroyed by logging.

The third way animals become endangered is when humans hunt them for food, fur, or other products; for sport; or in self-defense. By relentlessly pursuing animals that can't defend themselves against our weapons, we can eliminate entire species. For example, the Mediterranean monk seal, which lives in the Mediterranean Sea, has been hunted to near extinction for its fur. Other animals hunted to near extinction are the northern white rhino, killed for its horn, which some people believe has magical powers; and the orinoco crocodile, hunted for its hide.

THE HISTORY OF WHALE ENDANGERMENT

Many scientists are worried that some types of whales may be hunted to extinction in the future. The blue whale, which is the largest creature on Earth, is an endangered species. Although hundreds of thousands of blue whales lived in the oceans during the 1800s, there are only a few thousand left now.

There are many reasons for their endangerment. In the 1800s, whaling became a large and profitable industry. Whales, including blue whales, were hunted for their meat and for whale oil, which was used in lamps, for cooking, and as a lubricant. Whales were also hunted for *baleen*, a fingernail-like material that grows in huge triangular sheets in some whales' mouths. Until plastic was invented, baleen was used in shoehorns, corset stays, fishing rods, umbrellas, and clock springs.

In the early 1800s, it was very difficult to chase and kill a whale. The ships were too large and slow to chase the whales, so sailors lowered smaller whaleboats over the side. When they were close enough, the sailors threw harpoons, which were attached to the tiny boats by long ropes, into the whale's thick, blubbery hide. The whale often pulled a boat for miles before being caught; sometimes it pulled free or destroyed the boat and was never caught. Whaling was hard work and dangerous.

In the 1860s power harpoons were invented. Also, boats gradually became faster as coal and steam replaced the wind for power. These two developments changed the face of whaling forever. They allowed whalers to chase and kill many more whales than they could in the past. These new whaling practices, combined with the fact that whales bear young infrequently, began to lead to whale endangerment.

In 1946, the International Whaling Commission was formed to prevent whale extinction. The organization limits the number of whales that are killed each year and prohibits the killing of certain kinds of whales.

The whale simulation in this teaching unit helps students to understand the problems of species endangerment and to develop some practical solutions of their own.

DIRECTIONS FOR THE SIMULATION

Type the BASIC program listing that begins on page 19 into your computer, or choose a careful student to type it in for you. The version on page 19 is for Apple II series computers. See page 60 for information on how to convert the program for use on other computer models. Save the program on an initialized disk under the file name WHALING.

Divide your class into groups. The simulation allows up to 10 groups. Tell the students that each group is going to be the crew of a whaling vessel that sailed the north Atlantic Ocean in the 1830s.

The worksheet on page 18 shows a blank ship's log. Pass out a copy of the worksheet to each student. Have students follow along on their worksheets as you explain how the simulation works.

Explain that in this simulation, the computer keeps track of how much money and supplies each crew has, where each vessel is (at sea or on land), and how many whales are in the ocean. As whalers, students will decide how long their ships stay at sea or in port and what their whale-hunting strategy will be.

When you are ready to run the program, load the disk and type RUN WHALING. The program begins by asking the teacher how many months the hunt should last. Type 12 and press RETURN. Once students are familiar with the simulation, they can play a longer game, but 12 months are enough for beginners.

Next, enter the number of groups you have. Each crew makes up a name for its whaling vessel and enters it into the computer. Each team starts with one vessel, four smaller whaling boats, three month's worth of supplies, and $700 for every month of the simulation. For example, crews that hunt for 12 months start with $8,400. The crews take turns at the computer. Each turn represents one month of game time, beginning in January of 1830.

On their worksheets, have children record the name of their vessel, the sailing year (in this case, 1830), and the crew members' names (listing their name first).

During their first turn, students

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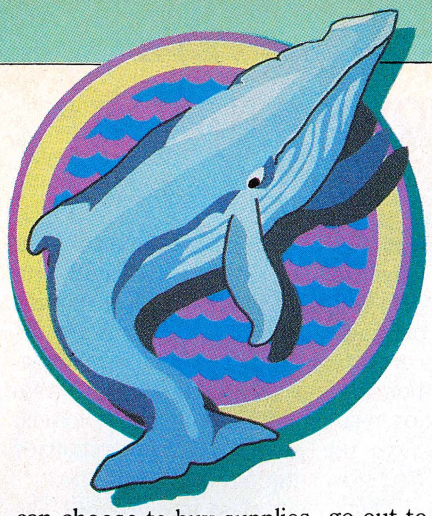


can choose to buy supplies, go out to sea, or stay in port (on land) for a month. They should record their choice by marking the appropriate box on their worksheet. Supplies consist of food to be used by the crew when at sea, or of whaleboats. A month's worth of food costs $400. Whaleboats (up to six) cost $1,000 each. When the game starts, teams can go out to sea immediately if they wish because they have three month's worth of supplies.

If a team goes out to sea, its students can search for whales or return to port. The computer reports when the crew sights a whale. The number of whales each crew sights reflects the whale population at the time, but fluctuates randomly as actual sightings do. Have students record the number of whales they sight in the appropriate box on their worksheet.

Once a whale is sighted, students automatically chase it in their whaleboats. Sometimes boats get destroyed or whales slip away. Students can increase their chances of catching whales by buying more boats. Have students record the number of whales they catch in the appropriate box on their worksheet. When they return to port, the caught whales are automatically sold for $1,000 each. Whalers can use the money they earn to buy more supplies and whaleboats so that they can go out to sea again.

Students are likely to ask questions about the simulation, such as, "Is this really what whaling was like?" or "What's the object of the game?" Try not to answer these kinds of questions at this time (unless you feel uncomfortable doing this). Explain that questions about why we play the game or how real it is are important, but that you prefer to talk about them at the end of the simulation. Write the questions on the board, and be sure to answer them at the end of the game.

DEBRIEFING ACTIVITIES

Once the game is over, the computer displays a table that shows the whale population at every turn in the game (see sample table below). The program tells children to copy the table on a piece of paper.

Have students convert the table to a graph on graph paper, like the one at right. The graph will show whether the whale population has increased or, as is more likely, decreased since the game began.

WHALE POPULATION:	
JANUARY, 1830	102
FEBRUARY, 1830	106
MARCH, 1830	82
APRIL, 1830	70
MAY, 1830	71
JUNE, 1830	73
JULY, 1830	62
AUGUST, 1830	46
SEPTEMBER, 1830	33
OCTOBER, 1830	34
NOVEMBER, 1830	34
DECEMBER, 1830	35

The computer records whale population.

If your whale population has decreased, use the graph to predict when it will become extinct if whaling continues at the same rate. To make this estimate, use a ruler to draw a line that connects the first dot with the last dot on the graph. Now use the ruler to extend that line at the same slant. The point where the line crosses the axis (the line where the number of whales is 0) indicates when your whale population is extinct. For example, if you extend the line in the sample graph on page 17, you can estimate that in August of 1831, the whale population will become extinct.

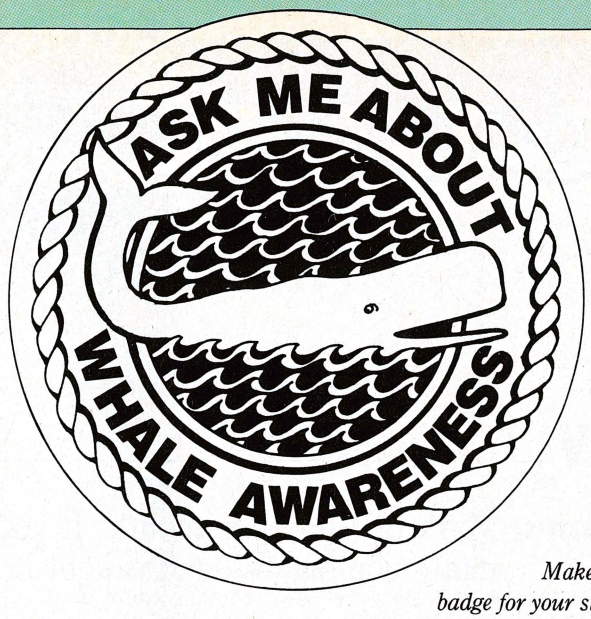
The computer also displays a chart that shows how much cash each crew has at the end of the game. Students are instructed to copy the total for their crew on paper. If you are using the simulation with more than one group, compare the amount of cash each group has at the end of the game. Also compare the total number of whales each group caught (add the numbers in the "Whales Caught" column on each crew's worksheet). Was there one group that caught more whales and made more money than the others? Explain that greed may benefit a particular group for a short period of time, but eventually that group will endanger the whale population and cause financial problems for all whalers.

DISCUSSING THE OBJECT OF THE GAME

Now it's time to discuss the purpose of the simulation. Write the following questions on the chalkboard and use them to lead a class discussion. Maybe your students asked some questions during the game. If so, add them to the list.

- What influences the number of whales in the simulation? *The whale population is influenced by how much we fish. When we're not fishing, the population increases. When we fish a lot, it decreases.*
- What factors help you catch a whale? *More whale boats and trips to sea help you catch whales.*
- What influences how many whales you see? *If there are more whales in the population, we see more whales. We can estimate the whale population from the number of sightings in a month at sea.*
- What will happen to our whaling business in the future? *If whales become extinct, we won't have any to catch. We'll run out of money because we have to feed our crews.*
- If we played the game again, how could we stay in business without endangering the whale population? *If we took just enough whales to make a living and stay in business, the whales wouldn't become extinct.*

Ask students what they thought the object of the game was: To make money? To save whales? To stay in business? If you have time, play the game again. Challenge the class to try to stay in business *and* keep the whale population at a high level (the actual point of the game). It can be done, but it requires cooperation.



Make copies of this badge for your students. Have them color it and then wear it to school so they can teach others about whale awareness.

Discussing the object of the game helps students understand that whalers weren't evil people trying to kill off one of Earth's magnificent creatures. Some were adventurers; some were people just trying to make a living. Like whalers, if students think the game's object is to make as much money as possible in a given time period, they will drive the whales to extinction. But, if they think the object is to make just enough money to make a living and continue whaling, nature will supply enough whales to support them forever. This concept applies to other animals, too. On every continent there are animals that have been pushed toward extinction by people who upset their natural life cycle. These animals range from the grizzly bear in North America to the black rhino in Kenya.

Once students understand this concept, they are ready to wear the "Whale Awareness" badge above. Make copies of the badge and pass them out; students can color the badge themselves. Declare a "Whale Awareness" day and have all the students wear their badges. When other children, teachers, and parents ask your students about whale awareness, have them explain the lesson they learned about striking a balance between earning a profit and endangering the whale population.

You might point out to students how the whale simulation is different from history. Tell students that whales were not endangered in the 1800s; there were hundreds of thousands of whales back then. In real life, it took many decades to endanger the vast whale population. But because we have a limited amount of class time, the simulation has only a couple hundred whales and students can catch and kill them more quickly than real whalers did. Also, because many kinds of whales travel in groups, sightings usually consisted of more than one whale. To simplify the simulation, crews sight and catch only one whale at a time.

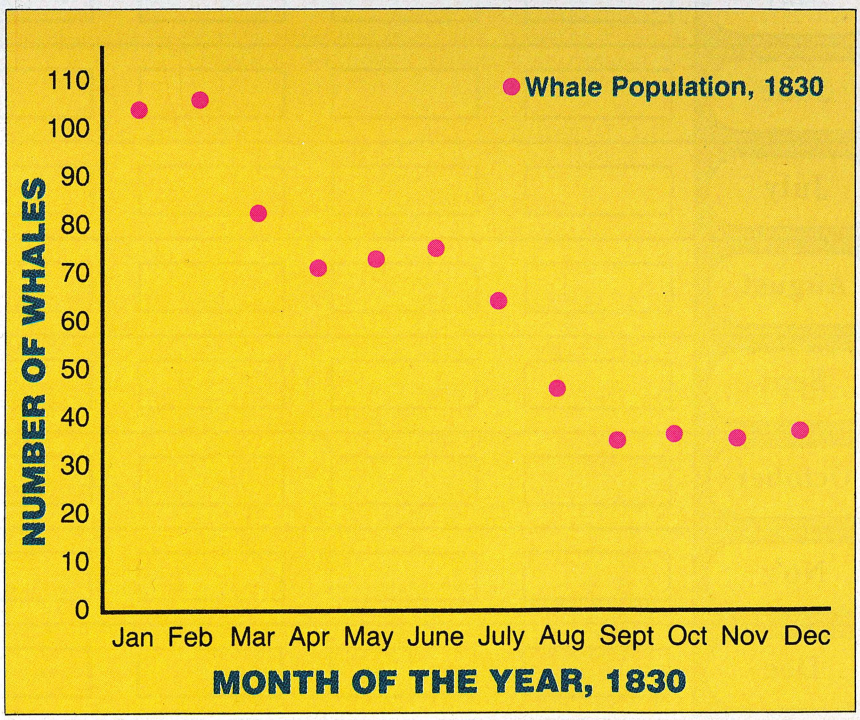
Explain some reasons for whale endangerment today, such as the powered harpoons and faster ships mentioned in the background material at the beginning of this article.

Students may ask what the whale situation is today. The answer varies depending on the kind of whale. For example, blue whales, which are the world's largest animal, are still an endangered species. There are 1,000 to 2,000 blue whales in the north Pacific and about 12,000 worldwide. Before whaling, there were probably 200,000 blue whales in the world.

Another type of whale that was hunted nearly to extinction is the gray whale. Since 1946, the gray whale has been protected from hunting. During that time, the species has made a comeback. There are now about 16,000 gray whales after a low of about 1,000.

(continued)

Tim Erickson is a curriculum developer with the EQUALS Project (a mathematics and computer in-service program with special focus on women and minority students) at the Lawrence Hall of Science, University of California at Berkeley.



Students make a graph of whale population at the end of the game. The graph shows how their hunting has affected the number of whales in the ocean.

COPY

SHIP _____ **YEAR** _____

CREW _____

Directions: Mark one box per month. If you search for whales, write down how many you sighted and caught in the last two columns.

	Bought Supplies / Stayed in Port	Went Out to Sea	Returned to Port	Searched for Whales	Whales Sighted	Whales Caught
Jan	☐	☐	☐	☐		
Feb	☐	☐	☐	☐		
March	☐	☐	☐	☐		
April	☐	☐	☐	☐		
May	☐	☐	☐	☐		
June	☐	☐	☐	☐		
July	☐	☐	☐	☐		
August	☐	☐	☐	☐		
Sept	☐	☐	☐	☐		
October	☐	☐	☐	☐		
Nov	☐	☐	☐	☐		
Dec	☐	☐	☐	☐		
					TOTAL	

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PROGRAM LISTING FOR *WHALING AWAY!*

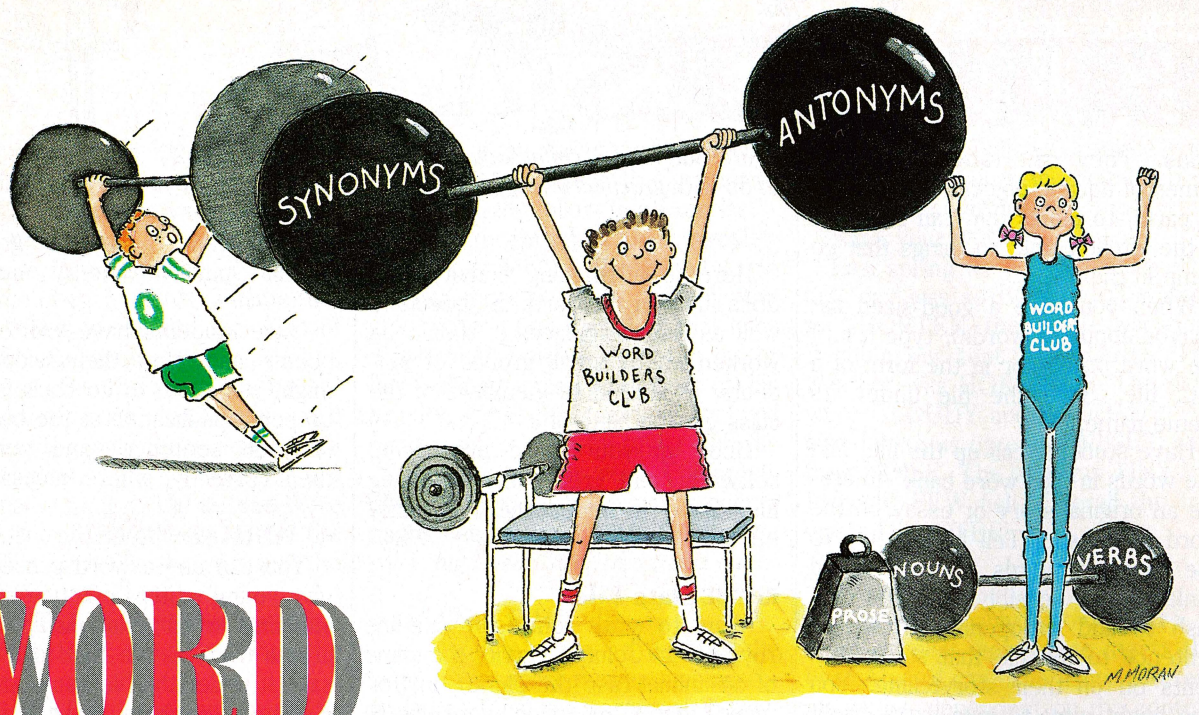
This program will run as listed on Apple computers. (Make sure your printer is set to the maximum line length before running the program.) To convert the program for use on Color Computers, Commodore 64 computers and TRS-80 Models II and 4, see the "Conversion Chart" on page 60.

```
10 REM WHALING AWAY @ 1986 BY SCHOLASTIC INC.
20 HOME:CLEAR
30 DEF FN P(P) = .1+.7*P/(WF*NV):REM PROBABILITY OF SE
EING A WHALE
40 DEF FN C(B) = .2+.15*B:REM PROBABILITY OF CATCHING
A WHALE
50 NS = 2:PB = 500:WL = 20:PRICE = 1000:PP = 400:BP =
1000:WF = 40:WB = .04
60 DIM NW(NS),SN$(NS):REM NS = NUMBER OF SITES
70 MO = 1:YI = 1830:YR = YI:NW(1) = 0:TT = 1
80 SN$(1) = "IN PORT":SN$(2) = "AT SEA"
90 DIM MO$(12):REM NAMES OF THE MONTHS
100 FOR I = 1 TO 12:READ MO$(I):NEXT I
110 DATA JANUARY, FEBRUARY, MARCH, APRIL
120 DATA MAY, JUNE, JULY, AUGUST
130 DATA SEPTEMBER, OCTOBER, NOVEMBER, DECEMBER
140 REM ENTER NUMBER OF MONTHS AND GROUPS
150 PRINT "   WELCOME TO WHALING AWAY!"
160 PRINT:PRINT "  THIS PROGRAM SIMULATES A WHALE HUNT
"
170 PRINT "IN THE YEAR 1830."
180 PRINT:PRINT "  HOW MANY MONTHS WOULD YOU LIKE THE"
190 PRINT "HUNT TO LAST? (12 IS A GOOD STARTING"
200 PRINT "NUMBER.)":INPUT TL
210 DIM WP(TL):REM WHALE POPULATION
220 PRINT:PRINT "  HOW MANY CREWS WILL GO ON THE WHALE
"
230 PRINT "HUNT (UP TO 10)?":INPUT NV
240 IF NV > 10 THEN PRINT "  ENTER A NUMBER FROM 1 TO
10.":GOTO 220
250 NW(2) = NV*WF:REM NUMBER OF WHALES
260 DIM NB(NV),CASH(NV),VN$(NV),VL(NV),WC(NV),VS(NV)
270 REM ENTER NAMES OF CREWS
280 HOME:PRINT "  EACH CREW MUST ENTER THE NAME OF ITS
"
290 PRINT "VESSEL."
300 FOR V = 1 TO NV
310 PRINT:PRINT "  ENTER THE NAME OF CREW ";V;"'S VESS
EL."
320 INPUT VN$(V):VL(V) = 1:VS(V) = 3:NB(V) = 4:CASH(V)
 = 700*TL
330 NEXT V
340 HOME:PRINT "  YOU ARE NOW READY TO START THE HUNT.
"
350 PRINT:PRINT "  DO YOU WANT INSTRUCTIONS (Y/N)?"
360 INPUT Z$:IF Z$ <> "Y" AND Z$ <> "N" THEN PRINT "
TYPE 'Y' OR 'N' AND PRESS <RETURN>.":GOTO 360
370 IF Z$ = "Y" THEN GOSUB 7000
380 REM BEGIN SIMULATION
390 FOR V = 1 TO NV
400 HOME:PRINT "  THE CREW OF THE ";VN$(V)
410 PRINT "SHOULD COME TO THE COMPUTER."
420 PRINT:PRINT "  PRESS <RETURN> TO TAKE YOUR TURN.":
INPUT Z$
430 GOSUB 6000:REM DISPLAY YEAR AND MONTH
440 IF VL(V) = 2 THEN VS(V) = VS(V)-1
450 PRINT:PRINT "  THE ";VN$(V);" IS ";SN$(VL(V));" WI
TH:"
460 PRINT:PRINT "   ";VS(V);" MONTH'S WORTH OF SUPPLIE
S"
470 PRINT "   ";WC(V);" WHALE(S) IN THE HOLD"
480 PRINT "   ";NB(V);" WHALEBOAT(S)"
490 IF VL(V) = 1 THEN GOSUB 4000:GOTO 510:REM IN PORT
500 IF VL(V) = 2 THEN GOSUB 2000:REM AT SEA
510 NEXT V
520 GOSUB 5000:REM NEXT MONTH
530 IF TT <= TL THEN 390:REM CONTINUE HUNT
540 REM END OF GAME
550 TT = TT-1:YR = YI:MO = 1
560 HOME:PRINT "  THE WHALE HUNT IS OVER. THIS CHART"
570 PRINT "SHOWS THE WHALE POPULATION FOR THE LAST"
580 PRINT TL;" MONTHS. COPY IT ON A PIECE OF PAPER."
590 PRINT "YOU WILL USE THE DATA IN A CLASS DIS-"
600 PRINT "CUSSION WITH YOUR TEACHER."
610 PRINT:PRINT "MONTH/YEAR","# OF WHALES"
620 PRINT "--------------------------"
630 FOR I = 1 TO TT
640 PRINT MO$(MO);" ";YR,WP(I)
650 MO = MO+1
660 IF MO > 12 THEN MO = 1:YR = YR+1:PRINT:PRINT "  PL
EASE PRESS <RETURN>.":INPUT Z$
670 NEXT I
680 IF TL <> 12 AND TL <> 24 THEN PRINT "  PLEASE PRES
S <RETURN>.":INPUT Z$
690 PRINT:PRINT "  THIS CHART SHOWS HOW MUCH CASH EACH
"
700 PRINT "CREW HAS. WRITE DOWN THE FIGURE FOR"
710 PRINT "YOUR CREW."
720 PRINT:PRINT "VESSEL NAME","CASH"
730 PRINT "--------------------------"
740 FOR I = 1 TO NV
750 PRINT VN$(I),"$";CASH(I)
760 NEXT I
770 END
1000 REM BUY SUPPLIES
1010 GOSUB 6000:REM DISPLAY DATE
1020 IF CASH(V) < PP THEN PRINT:PRINT "  SORRY--YOU'RE
 ALMOST BROKE! PRESS":PRINT "<RETURN>":INPUT Z$:RETURN
1030 PRINT:PRINT "  THE ";VN$(V);" IS IN THE WHALER'S
1040 PRINT "SHOP. YOU HAVE $";CASH(V);" IN CASH AND:"
1050 PRINT:PRINT "   ";VS(V);" MONTH'S WORTH OF SUPPLI
ES"
1060 PRINT "   ";NB(V);" WHALEBOAT(S)"
1070 PRINT:PRINT "  ENTER THE NUMBER OF YOUR CHOICE (1
-3)"
1080 PRINT "AND PRESS <RETURN>."
1090 PRINT:PRINT "  1  BUY ONE MONTH'S WORTH OF SUPPLI
ES"
1100 PRINT "($";PP;")."
1110 PRINT "  2  BUY A WHALEBOAT. ($";BP;")."
1120 PRINT "  3  LEAVE THE SHOP."
1130 INPUT B$:IF B$ <> "1" AND B$ <> "2" AND B$ <> "3"
 THEN 1130
1140 IF B$ = "1" THEN VS(V) = VS(V)+1:CASH(V) = CASH(V
)-PP:GOTO 1010
1150 IF B$ = "2" AND NB(V) > 5 THEN PRINT:PRINT "  YOU
 HAVE ENOUGH BOATS! PRESS <RETURN>.":INPUT Z$:GOTO 101
0
1160 IF B$ = "2" THEN NB(V) = NB(V)+1:CASH(V) = CASH(V
)-BP:GOTO 1010
1170 RETURN
2000 REM VESSEL IS AT SEA
2020 IF VS(V) < 1 THEN GOSUB 2500:RETURN:REM OUT OF SU
PPLIES
2030 IF WC(V) > WL THEN GOSUB 2600:RETURN:REM HOLD FUL
L
2040 IF NB(V) < 1 THEN GOSUB 2700:RETURN:REM OUT OF BO
ATS
2050 PRINT:PRINT "  ENTER THE NUMBER OF YOUR CHOICE (1
 OR"
```

(continued)

PROGRAM LISTING FOR *WHALING AWAY!* *(continued from page 19)*

```
2060 PRINT "2) AND PRESS <RETURN>."
2070 PRINT:PRINT "  1   SEARCH FOR WHALES."
2080 PRINT "  2   RETURN TO PORT."
2090 INPUT A$:IF A$ <> "1" AND A$ <> "2" THEN 2090
2100 IF A$ = "1" THEN GOSUB 3000
2110 IF A$ = "2" THEN VL(V) = 1
2120 RETURN
2500 REM OUT OF SUPPLIES
2510 VL(V) = 1:VS(V) = 0:REM VESSEL LOCATION AND VESSE
L SUPPLIES
2520 PRINT:PRINT "  OOPS! YOU JUST RAN OUT OF SUPPLIES
."
2530 PRINT "YOU GO BACK TO PORT."
2540 PRINT:PRINT "  PRESS <RETURN>.":INPUT Z$
2550 RETURN
2600 REM SHIP IS FULL OF WHALES
2610 VL(V) = 1:WC(V) = WL
2620 PRINT:PRINT "  OOPS! THE SHIP'S HOLD HAS TOO MANY
"
2630 PRINT "WHALES. YOU RETURN TO PORT RIGHT AWAY."
2640 PRINT:PRINT "  PRESS <RETURN>.":INPUT Z$
2650 RETURN
2700 REM OUT OF WHALEBOATS
2710 VL(V) = 1
2720 PRINT:PRINT "  OOPS! YOU'RE OUT OF WHALEBOATS."
2730 PRINT "  YOU GO BACK TO PORT RIGHT AWAY."
2740 PRINT:PRINT "  PRESS <RETURN>.":INPUT Z$
2750 RETURN
3000 REM SEARCH FOR WHALES
3010 S = 0:GOSUB 6000:REM DISPLAY DATE
3020 PRINT:PRINT "  THE ";VN$(V);" IS HUNTING FOR WHAL
ES."
3030 FOR D = 1 TO 1000:NEXT D:REM DELAY
3040 FOR T = 1 TO 28
3050 IF RND(1) > FN P(NW(VL(V))) THEN 3210
3060 IF NW(VL(V)) <= 0 THEN 3210
3070 HOME:S = S+1:PRINT MO$(MO);" ";T
3080 PRINT:PRINT "  THAR SHE BLOWS!!!"
3090 PRINT:PRINT "  THE ";NB(V);" WHALEBOAT(S) OF THE"
3100 PRINT VN$(V);" CHASE THE WHALE...."
3110 FOR D = 1 TO 1000:NEXT D
3120 K = 0:FOR I = 1 TO NB(V):IF RND(1.) < .03 THEN K
= 1
3130 NEXT I
3140 IF K = 1 THEN PRINT:PRINT "ALAS, A BOAT WAS DESTR
OYED IN THE CHASE":PRINT "AND THE WHALE ESCAPED!":NB(V
) = NB(V)-1:GOTO 3190
3150 IF RND(1.) < FN C(NB(V)) THEN 3170
3160 PRINT:PRINT "  TOO BAD! THE WHALE GOT AWAY!":GOTO
 3200
3170 PRINT:PRINT "  GOT ONE!  GOOD CATCH!":WC(V) = WC(
V)+1:NW(VL(V)) = NW(VL(V))-1
3180 IF WC(V) > WL THEN WC(V) = WL+1
3190 IF NB(V) < 1 THEN 3220
3200 IF T < 28 THEN PRINT:PRINT "  DO YOU WANT TO KEEP
 HUNTING (Y/N)?":INPUT A$:IF A$ = "N" OR A$ = "NO" THE
N 3220
3210 NEXT T
3220 PRINT:PRINT "  NO MORE SIGHTINGS FOR THIS MONTH."
3230 PRINT:PRINT "  THE ";VN$(V);" SIGHTED ";S;" WHALE
S."
3240 PRINT "  IT HAS ";WC(V);" WHALES IN ITS HOLD."
3250 PRINT:PRINT "  PRESS <RETURN>.":INPUT Z$
3260 RETURN
4000 REM VESSEL IS IN PORT
4010 CASH(V) = CASH(V)-2*PP
4020 IF WC(V) <> 0 THEN GOSUB 4500
4030 IF CASH(V) <= 0 AND VS(V) <= 0 THEN GOSUB 4600:
GOTO 4150
4040 IF CASH(V) <= 0 THEN GOSUB 4700:GOTO 4070
4050 PRINT:PRINT "  YOU PAID $";2*PP;" TO FEED THE
CREW."
4060 PRINT "  YOU NOW HAVE $";CASH(V);" IN CASH."
4070 PRINT:PRINT "  ENTER THE NUMBER OF YOUR CHOICE
(1-3)"
4080 PRINT "AND PRESS <RETURN>."
4090 PRINT:PRINT "  1  BUY SUPPLIES."
4100 PRINT "  2  GO OUT TO SEA."
4110 PRINT "  3  STAY IN PORT FOR A MONTH."
4120 INPUT A$:IF A$ <> "1" AND A$ <> "2" AND A$ <> "3"
THEN 4120
4130 IF A$ = "1" THEN GOSUB 1000
4140 IF A$ = "2" THEN VL(V) = 2
4150 RETURN
4500 REM WHALE SALE
4510 PRINT:PRINT "  YOU HAVE JUST SOLD YOUR ";WC(V)
4520 PRINT "WHALES FOR $";WC(V)*PRICE;"."
4530 CASH(V) = CASH(V)+WC(V)*PRICE:WC(V) = 0
4540 RETURN
4600 REM COMPANY BROKE
4610 CASH(V) = 0
4620 PRINT:PRINT "  YOUR WHALING COMPANY IS BROKE. BET
TER"
4630 PRINT "LUCK NEXT TIME!"
4640 PRINT:PRINT "  PLEASE PRESS <RETURN>.":INPUT Z$
4650 RETURN
4700 REM OUT OF CASH
4710 VS(V) = VS(V)-1:CASH(V) = 0
4720 PRINT:PRINT "  YOU DON'T HAVE ENOUGH MONEY TO
FEED"
4730 PRINT "THE CREW OR BUY MORE SUPPLIES.  YOU"
4740 PRINT "BETTER GO WHALING--FAST!"
4750 RETURN
5000 REM NEW MONTH
5010 MO = MO+1:S = 0:IF MO > 12 THEN MO = 1:YR = YR+1
5020 FOR I = 1 TO NS:GOSUB 5100:S = S+NW(I):NEXT I
5030 WP(TT) = S:TT = TT+1
5040 RETURN
5100 REM WHALE REPRODUCTION
5110 LX = NW(I)
5120 FOR J = 1 TO LX
5130 IF RND(1.) < WB THEN NW(I) = NW(I)+1
5140 NEXT J
5150 RETURN
6000 REM DISPLAY CURRENT MONTH AND YEAR
6010 HOME:PRINT "   *** ";MO$(MO);", ";YR;" ***"
6020 RETURN
7000 REM INSTRUCTIONS
7010 HOME:PRINT "  EACH GROUP STARTS WITH A VESSEL, 4"
7020 PRINT "SMALL BOATS FOR CHASING WHALES, ";VS(1)
7030 PRINT "MONTH'S WORTH OF SUPPLIES, AND $";CASH(1);
"."
7050 PRINT:PRINT "  WITH THE CASH, YOU CAN BUY MORE
BOATS"
7060 PRINT "AND MONTHLY SUPPLIES."
7070 PRINT:PRINT " FOR YOUR FIRST TURN, YOU CAN CHOOSE"
7080 PRINT "TO BUY SUPPLIES, GO OUT TO SEA, OR WAIT"
7090 PRINT "IN PORT."
7100 PRINT:PRINT "  AT SEA, YOU CAN HUNT FOR WHALES.
(THE"
7105 PRINT "VESSEL HOLDS UP TO ";WL;" WHALES.)"
7110 PRINT:PRINT "  WHEN YOU RETURN TO PORT, YOU RECE
IVE"
7120 PRINT "$";PRICE;" FOR EACH WHALE THAT YOU CAUGHT."
7130 PRINT:PRINT "  EACH TIME YOU TAKE A TURN, A MONTH"
7140 PRINT "PASSES. THE HUNT LASTS FOR ";TL;" MONTHS."
7150 PRINT:PRINT "  PRESS <RETURN> TO BEGIN.":INPUT Z$
7160 RETURN
```



WORD BUILDERS

TEN WAYS TO USE THE WORD PROCESSOR TO EXERCISE THOSE VOCABULARY MUSCLES

BY BERNAJEAN PORTER

Michael Moran

Vocabulary building and muscle building are similar in many ways. Both require training, diligence, and practice. Both also require special equipment. In the case of vocabulary building, one effective exercise machine is the word processor. Used properly, its benefits as a vocabulary building tool can be twofold: it can create situations in which students learn new words, and it can demonstrate (actually display) the different effects vocabulary has on writing.

In the following language arts activities, students are given opportunities to do both. To do the activities, use any word processing program that can SAVE, REMOVE, MOVE, SEARCH, REPLACE, and INSERT text.

Each of the exercises requires that you create special data files. Setting up any of these data files is easy. Simply boot up your word processing program, type in the data file exactly as described in this article, and save it on a blank disk or cassette under its specified file name.

When students are ready to try an activity, tell them to boot a word processing program into their computer. Next they will need to load the data file. After completing the activity, students will want to save their finished work on another blank disk or cassette, or print it out. You might want to train an "expert" to help with these procedures until everyone is comfortable with how they are done.

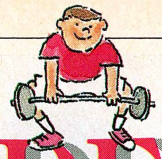
1. WORD BANKS

Many children already have interesting words in their oral language and only need prompting to make use of them in their writing. With your word processor, you can create endless "word banks," or computerized files, of student vocabulary.

To make a word bank, gather your students in a circle, and encourage them to suggest as many words as they can on a particular theme. The possibilities for a theme are enor-

(continued)

WORD BUILDERS



mous. They can range from the names of aquatic objects, to computer parts, to things that can be found in the kitchen sink, to things that go bump in the night!

When you have a good-sized list (maybe about 10 words), type it into the word processor in the form of a data file. Save the file under its theme name.

Have students call up the file, and use words in the "word bank" to create an original story or essay on the word processor. Tell kids to try to use as many words from the word bank as they possibly can. You may wish to add an opening phrase or sentence to the file that starts students off on their storytelling. You also might want to give extra credit to students who can use every single word in the word bank, and still have their stories sound logical!

The following data file is an example of a completed word bank for a "noisy" story. Save it under the file name NOISY. It can then be used by students at a computer station, or be printed out for use at regular classroom desks.

NOISY Data File

Use some of these words to write a story about noise:
cheer, roar, pop, laugh, drip, stomp, clap, crunch, shout, scream, buzz.

If you like, begin your story like this: "Sometimes it feels good to be noisy. When I . . ."

Save your work.

2. NEW WORDS BANK

A variation on the word bank idea is to input the week's vocabulary words (new words students will encounter during the week's lessons), into a word bank. Have students use these words to create an original story or essay. One hint: try to include different parts of speech into your vocabulary word bank: nouns, verbs, adjectives, and adverbs. Students then have more leeway when writing their stories. Rather than figure out what *cats*, *birds*, *dogs*, and *chipmunks* can all be doing in one particular story, they can, instead, be trying to figure out what a *chipmunk* can have to do with *gracious dining*, and so on.

3. ONE-LINE POEMS

Here is a rhyming activity that drills kids on the parts of speech as well as on vocabulary. It should be worked on by small groups of students, at least until members of the class get the hang of it.

Boot up your word processing software, and create the following file. Save it under the file name RHYME.

RHYME Data File

Want to write some silly one-line rhymes? In Column 1 write the name of an animal (use the plural); in Column 2 enter an action word (verb) that describes that animal; and in Column 3, write the name of something that can be found in a garden (again, use the plural). In Column 4, write a verb, or action word, that rhymes with the verb in Column 2. Read the line across, and see what you get.

Write as many one-line poems as you like. Then save your work on a blank disk or cassette.

Col 1 Col 2 Col 3 Col 4

When the group is gathered together, call up the file, and have students list five or six different animals (nouns). Enter the plural of their selections into Column 1 (the poems only work if the nouns used are plurals). In the second column, enter words that describe how each animal moves, acts, or sounds (verbs). In the third column, list things (nouns), again in plural, that students might find in a garden.

Then, working one line, or row, at a time, have students write in the fourth column an action word (verb) that rhymes with its corresponding verb in Column 2.

Before you know it, your students have written a series of one-line comical poems. Have members of the class read them aloud. Then save them so students can call up the file and create more poems on their own.

Here are some samples from a completed RHYME data file:

Col 1	Col 2	Col 3	Col 4
dogs	walk	carrots	talk
snakes	hiss	roses	kiss
worms	glow	beans	grow
gerbils	puff	beets	huff

Once students have written their poems and read them aloud, you might ask them to go back, add the proper capitalization at the beginning of each sentence, and punctuate them correctly, where necesary.

4. ANIMAL NAMES

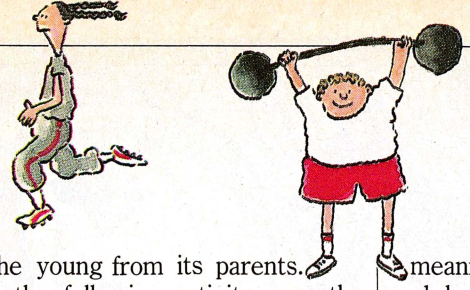
You can use a word processor to give young writers practice in understanding word relationships. First, create the data file that follows, and save it under the file name ANIMALS. Explain to students that the name of an animal can differ, depending on whether you are identifying the male, the female, or the young of a particular type of animal (species).

Tell students that the animal names used in the poem in the ANIMALS data file, are the "group name" or species name for each animal. Students are asked to insert, within parentheses, the name of the male of that particular species, the name of the female, and then the name of its young. *Answers: (bull, cow, calf); (dog, vixen, cub or pup); (cock or rooster, hen, chick); (stallion or stud; dam or mare; foal, pony, colt, or filly); (tom, lioness, kit); (billy or buck, nanny or doe, kid).*

Explain to students that there are some cases in which more than one word is possible. (As an example, *buck* and *ram* are both names given to male sheep.) See how many correct answers the children can come up with. Then, see if they can name other animal species for which more than one name applies. Have them list the males, females, and young of those animal groups as well. You can challenge students by asking them to write their own poems that use these animal names.

ANIMALS Data File

Different words are sometimes used to identify the male of a particular species of animal from the female,



WORD BUILDERS

or the young from its parents.

In the following activity, use the INSERT command on your word processor to:

1. Write in parentheses ( ) beside the name of each animal, a name that is only used to identify the male of that particular species.
2. Right after the word you inserted in parentheses, insert the word that identifies only the female of the same species.
3. Finally, next to the second word in each set of parentheses, insert the name that identifies the young of the species.

The CATTLE jumped over the moon
When the FOX ran away with the spoon.
The CHICKEN danced and played
As the HORSE pranced and neighed.
The BOBCAT leaped through the trees
While the GOAT ate its peas.

Save your work, or check it with with your teacher.

5. SYNONYMS

"*Said, said, said, said.* Is that all you know how to *say*? Don't you know any other words that *say* the same thing?!"

Young writers often have good ideas that are made to sound dull by overused words. Oftentimes students are not even aware that they are using a certain word repetitively. The following vocabulary activity is designed to make these young "offenders" conscious of how overused words affect a paragraph.

Create the VIVID data file that follows, and have a student read aloud the paragraph that appears in it. Discuss with students how the paragraph sounds, getting ideas on what is wrong, if they don't think it sounds perfect. Once you have drawn from them the fact that the word "said" is used too often, ask them to edit the passage.

Have students use the REPLACE command to delete the word "said" each time it appears in capital letters, and replace it with a more vivid *synonym* (word that has the same, or a similar meaning). A discussion of the meanings of the synonyms chosen, and how they affect the sentence, could naturally follow this exercise.

Have students save their completed work under the filename VIVID so you can check it at your convenience.

When you find a student that uses a particular word too often in his or her writing, remind him or her of this activity. If the problem persists, you may want to create a VIVID data file using that particular word. Commonly overused words for which students might need a VIVID data file include *good, big, went, fine, nice,* and *bad.*

VIVID Data File

A synonym is a word that has the same, or a similar meaning, as another word. Read the paragraph below. Each time you come to the word "said," replace it with a synonym. Try not to use the same synonym for "said" more than once.

Save your work.

George SAID that Mary was chewing gum. Mary SAID she wasn't. The teacher SAID that she thought Mary was chewing something. Mary SAID that it was only paper and that George had SAID she was chewing gum to get her in trouble. The teacher SAID for everyone to get back to work before anyone SAID anything else.

6. ANTONYMS

Tell students they can give an entirely different mood or meaning to any story, just by using their vocabulary. They can turn a scary ghost story into a humorous happening, or even a story about the best day in somebody's life, into a catastrophe.

To show students how they can do this, have them replace each word that appears in capital letters in the ANTONYMS file on this page, with an *antonym*, or word that means the opposite. In the process, they will change an unhappy vacation into a more pleasant one. Tell children to save their work.

ANTONYMS Data File

An antonym is a word that has the opposite meaning of another word. In the story that follows, replace each word that appears in capital letters with an antonym for it.

Save your work.

Last spring we went camping. The first day was so BORING. I wanted to SHORTEN the whole vacation. Pitching our tent was HARD. The weather was HORRIBLE. The days were CLOUDY and GLOOMY. The birds woke us up every NIGHT with their NOISE. The lake was TINY and I caught FEW fish. Overall the trip was a DISASTER.

7. HOMOGRAPHS

As you probably know, there is more to most words than meets the eye. A word can have many different meanings, dependent on the context it is used in, or the inflection placed on it. A simple word like *right,* for example, can mean *the opposite of left, the opposite of wrong,* and *a conservative political position.* It also has about 29 other definitions, according to *Webster's New Collegiate Dictionary.* The more a writer knows about the various definitions that a word can have, the more valuable that word becomes to the user.

Create the RIGHT data file that follows. In the activity, students are asked to choose one word that they consider to have the same meaning as the word "right." Using the commands SEARCH and REPLACE, they are then asked to insert that word wherever the word "right" appears in the passage. What they discover, is that the word *right* has more than one definition, and that these definitions are not interchangable.

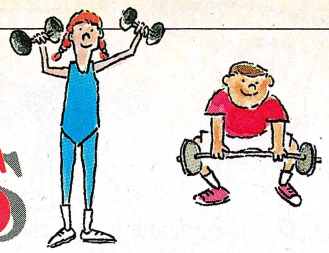
As a follow-up exercise, see how many other words your students can come up with to which the same multiple meaning "rule" applies. Then have them construct a short paragraph using as many of the multiple meanings of that word as they can.

RIGHT Data File

What does the word "right" mean to you? Choose a synonym for the word "right" (another word that has the same, or a similar meaning) and

(continued)

WORD BUILDERS



change all the "rights" in the passage below to that second word. Use the word processor's SEARCH and REPLACE commands to do this activity.

After school Sabra came RIGHT home. Her mom said, "Please do the chores RIGHT now. Also put on your winter hat as the cold will go RIGHT through you today."

As Sabra opened the hall closet on the RIGHT, she gave the RIGHT answer: "RIGHT, Mom! Oh, by the way, I got 10 out of 10 spelling words RIGHT today on my test."

"You knew your words RIGHT well, Sabra. You have a RIGHT to be proud," Mom replied.

What happens? What is wrong with the story? Why?

8. ALLITERATION:

Using the same initial sound in a series of words is called *alliteration.* Alliteration gives a special effect to creative writing. It can make prose sound poetic, and it enhances poetry as well. The tongue rolls comfortably over sentences where alliteration is used properly. It challenges a writer to search for just the right word.

Tell students to complete this activity by replacing the words in capital letters with words that are more specific. Each word that they choose should begin with the same letter (or rather, the same sound) as every other word that they choose. Have students read the outcome of the exercise aloud. Then have them save their work.

ALLITER Data File

Use the REPLACE command on your word processor to insert specific words in place of the general words given to you in parentheses. There's a catch, however: make sure that every word that you choose begins with the same letter, or at least with the same sound, as every other word that you choose.

Save your work.

I have a (ANIMAL) named (NAME). It comes from (PLACE). While standing one day on the (PLACE), it ate (FOOD), (FOOD), and (FOOD). Finally (NAME) saw a (THING) and ran away to (PLACE).

9. TONE:

Words can create many moods. Input the TONE file that follows, and have students soften the angry tone in the letter by changing the key words and phrases in capital letters.

Students can then create additional files and challenge each other to change the tone. Have students save their work.

TONE Data File

Turn the angry tone in the letter below into a more kindly one by changing the key words and phrases in capital letters.

Save your work.

Dear Sir,

This letter is to COMPLAIN that a STRANGE man STAMPED into my store, SLAMMED down his bag, and MUTTERED, "Who runs this JOINT?" I YELLED, "GET OUT."

He ARGUED that he would not, but ADMITTED that he was a SPY sent by your company. WHAT ARE YOU GOING TO DO ABOUT IT?

Sincerely, I.M. Mad

10. WELL-KNOWN SAYINGS

Disguise well-known proverbs or expressions by replacing some of the words in them with synonyms. Even if students are unfamiliar with the synonyms you insert, they may still be able to figure out the meaning of the words through context, or familiarity with the expression. This is a good way for children to gain confidence in their ability to confront words that they are unfamiliar with, and to gain exposure to words that they might otherwise shun.

To begin the activity, have students decode the expressions in the CODE file that follows. Tell them to see if they can do it first without the use of a dictionary or thesaurus. If they need help, however, tell them that there is nothing wrong with going to these source books for additional clues and information. The first one in the file is done for the students. Here are the other answers: *(2) Birds of a feather flock together; (3) Haste makes waste; (4) Two wrongs don't make a right; (5) A rolling stone gathers no moss;* and *(6) A watched pot never boils.*

Then, have students add their own "coded" expressions to the list, complicating the phrases they choose as much as possible with synonyms that they find in the thesaurus.

Choose some of the best expressions designed by students to make up a worksheet (or data file) with which to challenge the rest of the class.

Tell students to save their work.

CODE Data File

Each of the following is a saying or expression that you've probably heard before. The only difference is that some of the words in the expressions have been replaced with synonyms — words that have the same or a similar meaning. It is your job to replace these words (the ones in capital letters) with the words known in the more common expressions. The first one is done for you.

Check your answers with your teacher, and save your work.

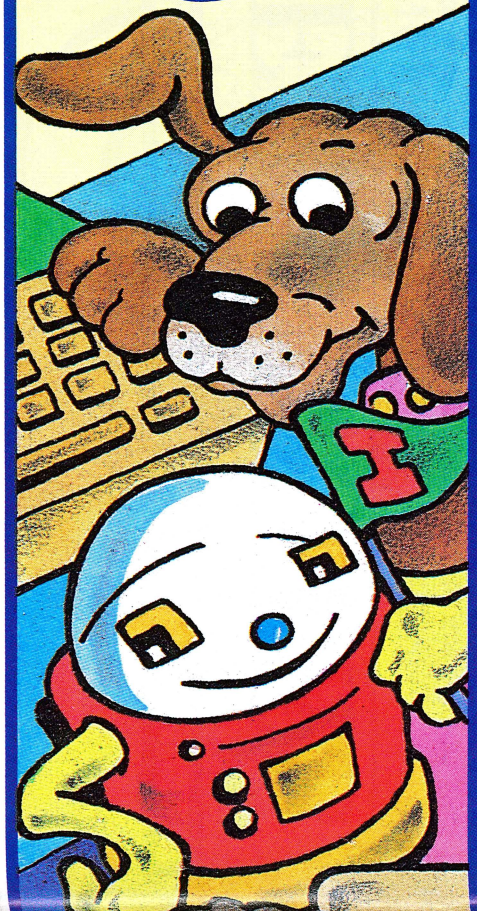
1. POPULATIONS who DWELL in GLAZED ABODES shouldn't FLING MINERALS. (People who live in glass houses shouldn't throw stones).
2. FOWLS of a PLUME CONGREGATE together.
3. ACCELERATION makes DETERIORATION.
4. Two BLUNDERS don't COMPOSE a JUSTIFICATION
5. A KINETIC CRAG ACCUMULATES no VEGETATION.
6. A TENDED SAUCEPAN never BUBBLES.

Now that you have the idea, see if you can add a few "coded" expressions of your own. Use them to stump your friends.

Bernajean Porter is a senior educational technology consultant for the Colorado Department of Education in Denver, CO. ■

ODES TO A

AN ODE IS A POEM WRITTEN IN HO
THE ODES ON THIS POSTER ARE WRITTEN ABO
DO YOU LIKE COMPUTERS? IF SO, WR



COMPUTER KID

I'm a computer kid.
I love my new machine.
I do what I always did,
But I do it on a screen.

I'm a keyboard kid.
I've learned to type like crazy.
I do what I always did—and more!
'Cuz now I'm not so lazy.

I'm a printout kid.
I love to run off copy.
I do what I always did,
But I do it on a floppy!

MY COMPUTER

Scholastic Inc. • March 1986

COMPUTER

ONOR OF SOMEONE OR SOMETHING.
UT ALL KINDS OF COMPUTERS—EVEN ROBOTS!
ITE YOUR OWN ODE TO A COMPUTER!

WHAT MAKES A COMPUTER COMPUTE?

What makes a computer compute?
What makes its bright lights blink?
What makes a computer...
think?

How does a computer compute?
How does it run inside?
How does a computer...
decide?

Why does a computer compute?
Why does it clatter and perk?
Why does a computer...
work?

MICRO TIMES™

The mini-magazine for kids who love computers.

Published by Scholastic Inc. March 1986

More Milk, Fewer Cows!

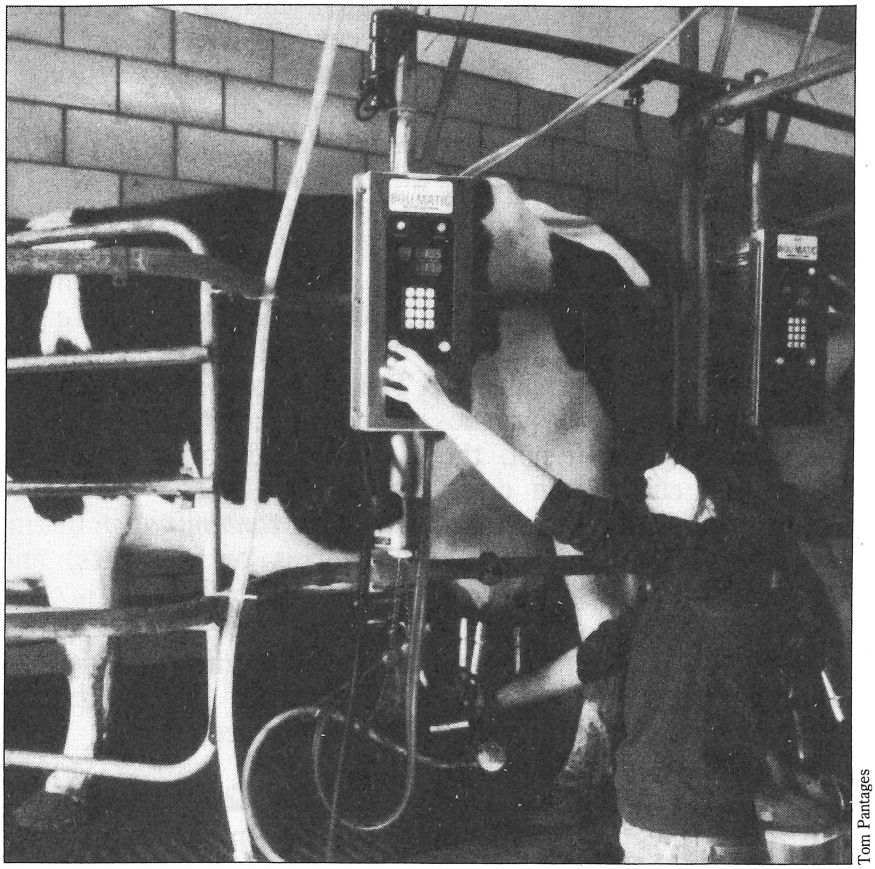
At breakfast, you put it on your cereal. At lunch, you drink it by the glass. After school, you sip it warm with cocoa.

As you might have guessed, we're talking about milk, one of America's favorite drinks. People in the U.S. drink nearly nine billion gallons of milk each year. That's enough to fill 31,121 swimming pools!

Where does all that milk come from? From cows, of course! About 11 million cows live on U.S. dairy farms.

That might sound like a lot of animals, but it's only half the number of milk cows that lived on U.S. farms 30 years ago.

Even with half as many cows, we still get the same amount of milk each year. How can that be? The answer has to do, in part, with computers. Computers help modern farmers get twice as much milk from each cow.



Tom Pantages

A computer weighs the cow's milk as it flows into tanks.

First, the farmer gives each cow a collar that has a tiny computer in it. The computer stores the cow's ID number.

The farmer then enters the number into a central computer to get information about the cow. For example, computers

(Continued on next page.)

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More Milk, Fewer Cows..... 1,2
Bug Busters 2
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Farmer's Helper Robot 4

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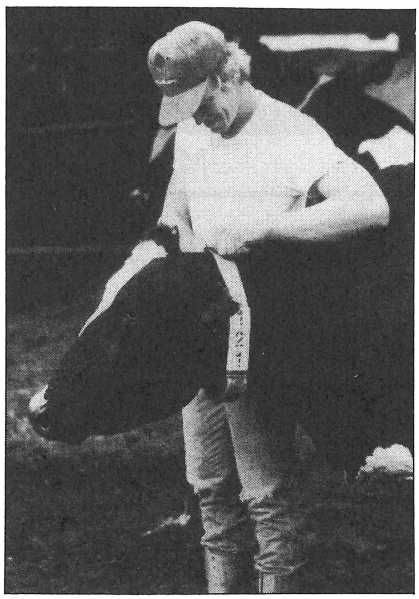
Written by Lorraine Hopping.

More Milk, Fewer Cows

(Continued from page 1.)



Chuck O'Rear

Attaching a computerized collar.

can show if the animal is one of the top 10 milk producers for the week. If not, the farmer can change the cow's diet to make it give more milk. (To produce the most milk possible, cows must eat exactly the right amount of grain.)

The cows' feeding bins are also computerized. The bins are empty, except for a tiny computer placed inside each one. When a cow dips her head into a bin, the tiny computer reads the cow's ID number on the collar. It then checks the central computer to see how much food the cow has eaten that day. If the cow has eaten less than her daily allowance, the computer drops grain into the bin. If a cow has eaten just enough, the bin stays empty.

If a cow stops eating altogether, it might mean that she is sick. The computer then warns the farmer so that he or she can take care of the cow.

This process also keeps cows from overeating. They stay healthier that way. The healthier the herd, the more milk it produces.

When a cow enters the milking room (called a *parlor*), the farmer again punches her ID number into the computer. If the cow is taking medicine, the computer turns on a red light. This means that the cow's milk is unsafe to drink and must be thrown away.

The computer weighs how much milk each cow gives. If the amount is higher than last time, the computer increases the cow's daily food allowance. That way, she will continue to give a lot of milk.

Finally, the milk is sent to factories. There, computers test it for *contamination* (harmful germs or elements) and measure its fat and protein content. Some of the milk is bottled for drinking. The rest is made into butter, cheese, yogurt, and ice cream.

Review Questions

1. Do more dairy cows live on today's U.S. farms than on farms 30 years ago? Is our yearly supply of milk more, less, or the same?

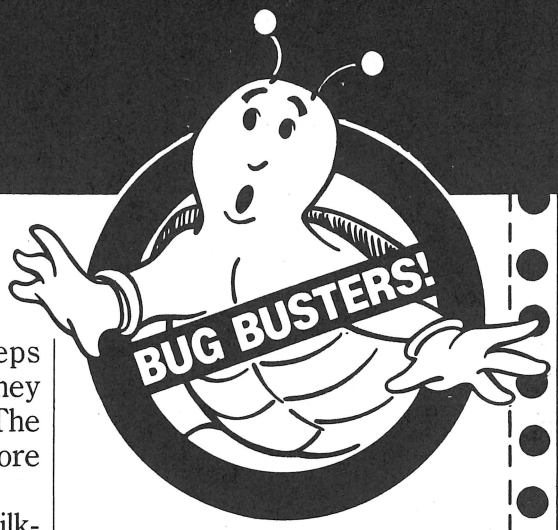
2. Why do farmers put computerized collars on cows?

3. How do computers keep cows from eating too much?

4. How does the farmer know if the cow's milk is safe to drink?

5. Name three ways computers help cows produce more milk.

Statistics from Economic Research Service, U.S. Department of Agriculture.



Carol's Clover

Four-leaf clovers are supposed to bring good luck, but they're very hard to find. That's why Carol decided to make one using Logo. That's her *Clover* program below. It has a few bugs in it, though.

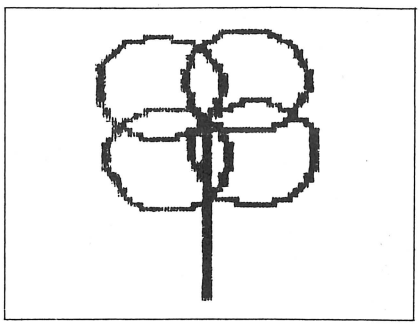
Find and fix the bugs. Then boot Logo. Type in the corrected program. Type CLOVER and press RETURN or ENTER.

When the clover appears on the screen, make a wish. But remember: don't tell anyone your wish. If you do, it won't come true!

```
TO CLOVER
  HIDE TURTLE
  FORARD 40
  LEFT 45
  REPETE 4 [LEAF LFT 90]
END

TOLEAF
  REPEAT36    [FORWAD   2
RIGHTT 10
END
```

ANSWERS: See page 60 of your teacher's copy of *Teaching and Computers* magazine.



Carol's four-leaf clover.

PROGRAM LISTING!

Knock-Knock Joke Teller

This *Knock-Knock!* program makes the computer tell *really* funny knock-knock jokes. No kidding!

What To Do

1. Put your computer in BASIC. Type NEW and press RETURN or ENTER.

2. Type in the program listing below. If you have an Atari computer, add this line: 1 DIM X$(100),Y$(100),A$(100).

Knock-Knock Program

```
10 READ X$,Y$
20 IF X$="STOP" THEN 100
30 PRINT " KNOCK, KNOCK!"
40 INPUT A$
50 PRINT X$
60 INPUT A$
70 PRINT Y$
80 PRINT
90 GOTO 10
100 PRINT " THAT'S ALL, FOLKS. . . ."
110 END
120 DATA AMOS, A MOSQUITO BIT ME.
130 DATA AMOS, AMOS BE-GOING.
1000 DATA STOP, STOP
```

3. Type RUN and press RETURN or ENTER.

Knock-Knock! Challenges

How many of these programming challenges can you do?

- Add your own knock-knock joke to the program. (See the "Joke File" for ideas.)
- Change the program so that the computer tells the jokes in a random order. (A random order is an order that changes.)
- Change the program so that the player can input a guess at the answer. Have the computer say if each guess is right or wrong. Also, let the player "give in" at any time. If the player gives in, the computer should print the punch line.
- Write a program that makes the computer tell other kinds of jokes, such as riddles.

Joke File

Knock, knock!
Who's there?
Chip
Chip who?
Chip, chip hooray!

Alexandra Hollis
Charlottesville, VA

Knock, knock!
Who's there?
Bit.
Bit who?
Bit you didn't know it was me!

Elizabeth Donner
Omaha, NE

Knock, Knock!
Who's there?
Computer.
Computer who?
Sorry, my memory banks are empty today.

Katherine Daly
South Nyack, NY

Write Your Own Knock-Knock Joke Here:

The Farmer's Helper is a Robot!

Farmer Frank owns an animal farm that raises cows, chickens, sheep, horses, and pigs. He needs extra help caring for all the animals.

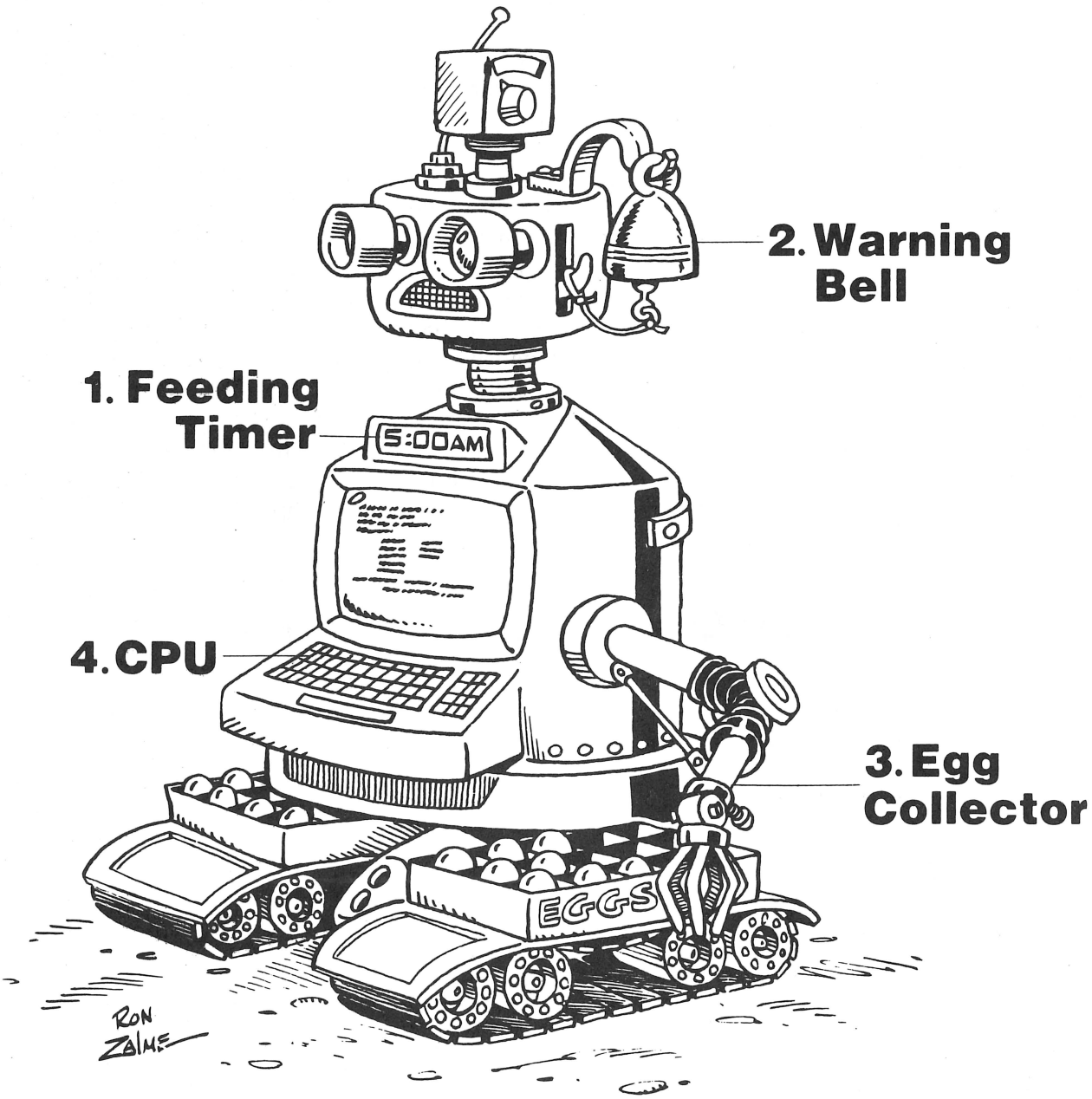
Robots are great helpers. That's why Farmer Frank decided to design a farmer's robot. On this page is part of his design. So far, the robot has:

1. A clock that tells it when to feed the animals.
2. A bell to warn animals to get out of its way.
3. An egg collector to pick up and pack eggs into cartons.
4. A computer to control all the parts.

Your job is to draw these parts on the robot design.

- A cow milker.
- A chicken feeder.
- Speakers for calling animals.
- Scissors or a razor for *shearing* (clipping) sheep.
- A shovel for cleaning pig pens and horse stables.

Farmer's Helper



DIRECTIONS FOR USING THE WORKSHEETS ON THIS POSTER

TEACHERS' NOTES

The worksheets on this poster have two purposes: they provide short review lessons on BASIC programming and they expose children to poetry. The first worksheet, labeled "Primary," is designed for use with primary grade children. The bottom two worksheets, both labeled "Intermediate," are to be used with children in grades 4 through 8.

Duplicate the worksheets that correspond to your grade level, hang up the other side of this poster, and you are ready to present a lesson on poetry *and* BASIC programming!

START WITH THE POSTER

Direct students' attention to the "Odes to a Computer" poster (on the flip side of this poster). Have a child read the poster's introductory paragraph aloud. It will explain what an *ode* is (a poem written in praise of someone or something).

Let kids take turns reading aloud the computer odes on the poster. Then ask them to write their own poems, or odes, about computers (on a word processor, if possible). When children are finished, have them read their poems aloud and then display hard copies on a bulletin board.

REVIEW A FEW BASIC COMMANDS

Before you distribute the worksheets, make sure students know how to use the following BASIC commands:

1. NEW tells the computer to clear its memory and get ready to store another program.
2. PRINT tells the computer to show words, numbers, or symbols on the screen. Those words, numbers, or symbols must always be in quotation marks.
3. END tells the computer that a program is completed.
4. RUN orders the computer to carry out a program.

Remember: In a program listing, the number of a program line comes first, followed by a space, and then the BASIC command word and any other information the computer needs to perform a task. Here is a short BASIC program that tells the computer how to print the word "word."

```
NEW
10 PRINT "WORD."
20 END
```

For more information on using the BASIC commands listed above, see the BASIC Challenge Cards column in your copy of the February 1986 issue of *Teaching and Computers* magazine.

DISTRIBUTE THE WORKSHEETS

Distribute the worksheets that correspond to your students' grade level and have them complete the sheets individually. Access to a computer is optional for completing the Primary Worksheet, not needed at all for Intermediate Worksheet #1, and absolutely necessary for completing Intermediate Worksheet #2.

Following are the teaching objectives and answers for each of the worksheets.

Primary Worksheet: This worksheet is for students in grades K-3 who are just learning BASIC. Students complete a program listing that uses PRINT statements to display the nursery rhyme, "Humpty Dumpty." As a challenge activity, they can then enter the program into their computer and see the display. The completed program listing should read as follows:

```
NEW
10 PRINT "HUMPTY DUMPTY SAT ON A WALL,"
20 PRINT "HUMPTY DUMPTY HAD A GREAT FALL."
30 PRINT "ALL THE KING'S HORSES AND ALL THE KING'S MEN,"
40 PRINT "COULDN'T PUT HUMPTY TOGETHER AGAIN."
50 END
```

Intermediate Worksheet #1: This worksheet is for students in grades 4 through 8. It contains a program listing that uses PRINT statements to display selections from three famous poems written by Henry Wadsworth Longfellow. The program listing has several bugs in it, however. Children are to find the bugs and insert the corrections in pencil where they belong in the program listing.

The following corrections should be made to the program listing: insert a space and the word PRINT in line 30 right after the line number; change first line numbered "50" to "40;" insert end quote in line 50; change PRONT to PRINT in line 60; put a space between command and quote in line 80; put a space between line number and PRINT in line 100; insert PRINT in line 130; capitalize all letters in Print in line 150; change FINISHED to END in line 190.

Answer to Challenge: The titles of the poems in the program are "Paul Revere's Ride," "The Village Blacksmith," and "The Children's Hour."

Intermediate Worksheet #2: This worksheet is for students in grade 4 through 8. It provides a program listing that will help children write their own poems. Students enter the listing into their computer, type RUN, press ENTER or RETURN, and follow the directions the program gives them. They will produce original poems.

The challenge segment of this worksheet asks kids to create a program listing that will help them write a poem that rhymes. Answers will vary.

PRIMARY

WORKSHEET TO COPY AND USE WITH THIS MONTH'S POSTER

NAME: _____

FINISH THE POEM

DIRECTIONS: The program below should print a poem. But it is not finished yet. Use the word list to finish the poem. Write your answers on the blank lines.

```
NEW
10 PRINT "HUMPTY DUMPTY SAT
   ON A _____."
20 PRINT "HUMPTY DUMPTY HAD A
   GREAT _____."
30 PRINT "ALL THE KING'S HORSES
   AND ALL THE KING'S _____,"
40 PRINT "COULDN'T PUT HUMPTY
   TOGETHER _____."
50 END
```

WORD LIST

AGAIN
FALL
MEN
WALL

TO SEE THIS PROGRAM ON THE COMPUTER:

1. Put your computer in BASIC
2. Type the program into the computer.
3. Type RUN.
4. Press RETURN or ENTER.

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COPY

INTERMEDIATE

WORKSHEET TO COPY AND USE WITH THIS MONTH'S POSTER

NAME: _____

DEBUG THE POEMS

DIRECTIONS: When there's a mistake in a BASIC program, the error is called a *bug*. The BASIC program below is supposed to display the first stanzas of three famous poems by Henry Wadsworth Longfellow, but there are too many bugs in it. Can you fix the program? Write your corrections where they belong.

Can you name the poems in this program? Write their titles in the blanks on lines 10, 70, and 140.

```
NEW
10 PRINT "_____"
20 PRINT "LISTEN, MY CHILDREN, AND YOU SHALL HEAR"
30 "OF THE MIDNIGHT RIDE OF PAUL REVERE,"
50 PRINT "ON THE EIGHTEENTH OF APRIL, IN SEVENTY-
FIVE,"
50 PRINT "HARDLY A MAN IS NOW ALIVE
60 PRONT "WHO REMEMBERS THAT FAMOUS DAY AND
YEAR."
70 PRINT "_____"
80 PRINT"UNDER A SPREADING CHESTNUT TREE"
90 PRINT "THE VILLAGE SMITHY STANDS;"
100PRINT "THE SMITH, A MIGHTY MAN IS HE,"
110 PRINT "WITH LARGE AND SINEWY HANDS;"
120 PRINT "AND THE MUSCLES OF HIS BRAWNY ARMS"
130 "ARE STRONG AS IRON BANDS."
140 PRINT "_____"
150 Print "BETWEEN THE DARK AND THE DAYLIGHT,"
160 PRINT "WHEN THE NIGHT IS BEGINNING TO LOWER,"
170 PRINT "COMES A PAUSE IN THE DAY'S OCCUPATIONS"
180 PRINT "THAT IS KNOWN AS THE CHILDREN'S HOUR"
190 FINISHED
```

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INTERMEDIATE

WORKSHEET TO COPY AND USE WITH THIS MONTH'S POSTER

NAME: _____

CREATE YOUR OWN POEM

DIRECTIONS: Enter this BASIC program into your computer. When you are finished, type RUN and press RETURN or ENTER. You'll have a program that will help you write a poem!

```
NEW
10 HOME
20 PRINT "WELCOME TO THE WORLD OF POETRY!"
30 PRINT "WHAT'S YOUR NAME?"
40 INPUT N$
50 PRINT "HELLO, ";N$;", LET'S WRITE SOME POETRY."
60 PRINT:PRINT "FIRST, ENTER A NOUN.": INPUT A$
70 PRINT "NOW ENTER TWO WORDS THAT DESCRIBE ";A$;"."
80 PRINT "ENTER THE WORDS ONE AT A TIME."
90 INPUT B$:INPUT BB$
100 PRINT "ENTER THREE WORDS THAT TELL WHAT ";A$;" DOES."
110 PRINT "AGAIN, ENTER THE WORDS ONE AT A TIME."
120 INPUT C$:INPUT CC$:INPUT CX$
130 PRINT "ENTER A PHRASE OR SENTENCE ABOUT ";A$;".":INPUT D$
140 PRINT: "ENTER A SYNONYM FOR ";A$;".": INPUT E$
150 HOME: PRINT "HERE IS YOUR POEM:"
160 PRINT:PRINT A$;" BY ";N$
170 PRINT:PRINT A$
180 PRINT B$;", ";BB$
190 PRINT C$;", ";CC$;", ";CX$
200 PRINT D$
210 PRINT E$
220 PRINT:PRINT "NICE WORKING WITH YOU, ";N$;"...."
230 END
```

NOTE: This program will run as listed for Apple computers. If you have a Commodore computer, change HOME to PRINT CHR$(147) in lines 10 and 150. If you have a TRS-80 or IBM computer, change HOME to CLS in lines 10 and 150. If you have an Atari computer, change HOME to PRINT CHR$(125) in lines 10 and 150. Atari users also must add these lines:

```
1 DIM A$(50),B$(50),C$(50),CC$(50)
2 DIM CX$(50),D$(120),E$(50),N$(50)
```

CHALLENGE: Can you write a similar program to create a poem that rhymes?

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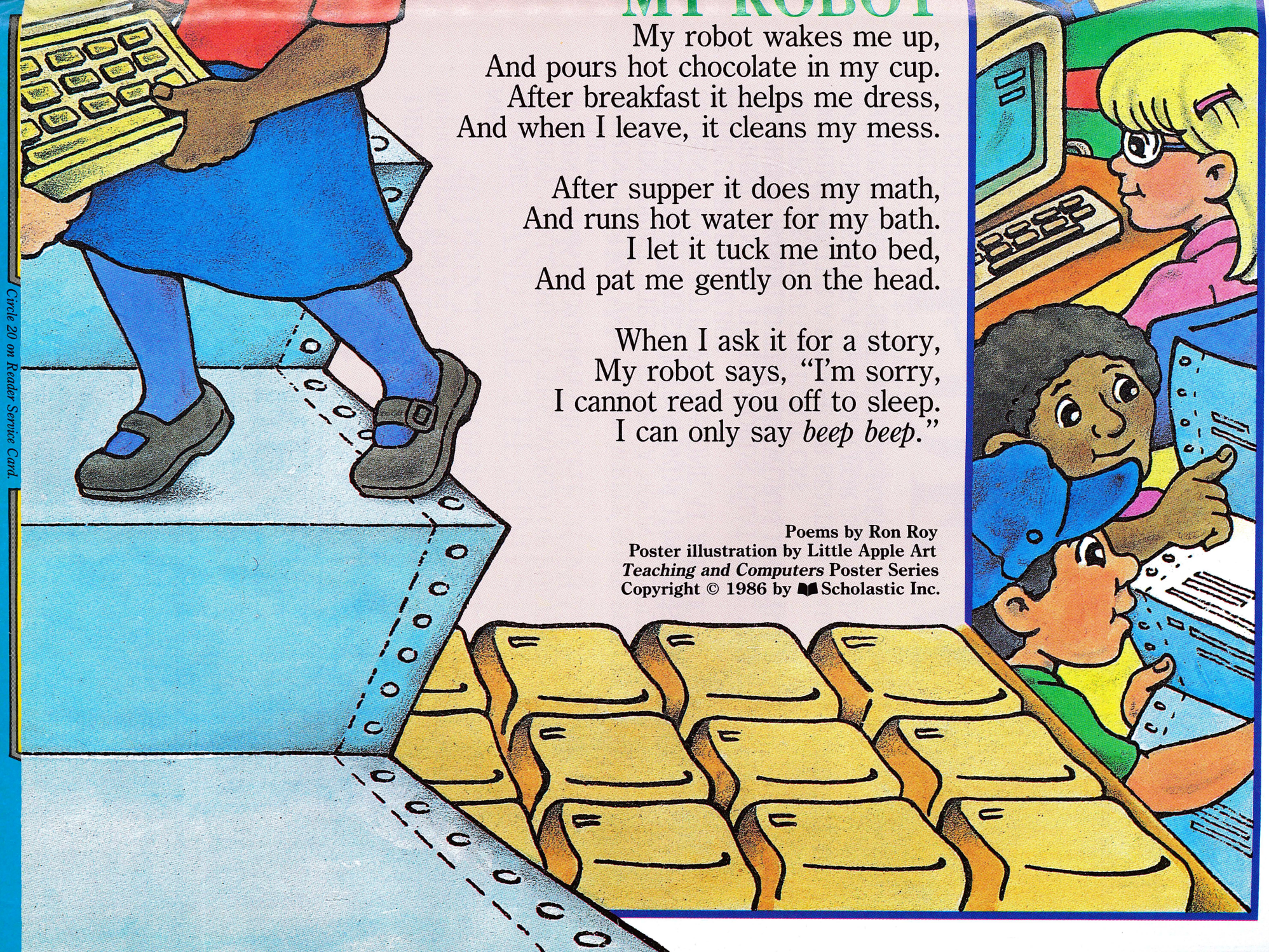

MY ROBOT

My robot wakes me up,
And pours hot chocolate in my cup.
After breakfast it helps me dress,
And when I leave, it cleans my mess.

After supper it does my math,
And runs hot water for my bath.
I let it tuck me into bed,
And pat me gently on the head.

When I ask it for a story,
My robot says, "I'm sorry,
I cannot read you off to sleep.
I can only say *beep beep*."

Poems by Ron Roy
Poster illustration by Little Apple Art
***Teaching and Computers* Poster Series**
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Grasses have blades.
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Peonies need sun.
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Flowers are free.
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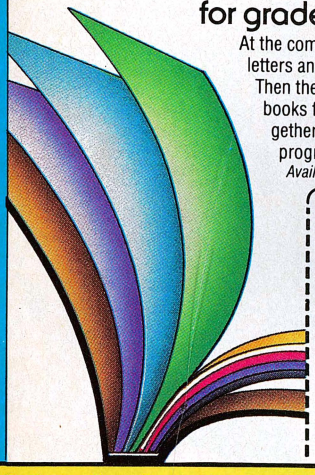

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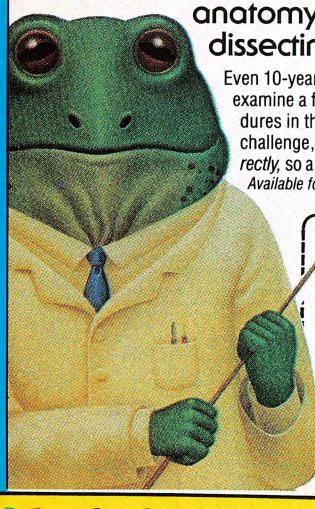

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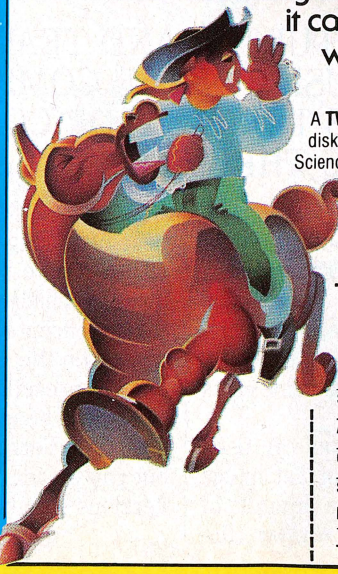

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BY DEE MILLER

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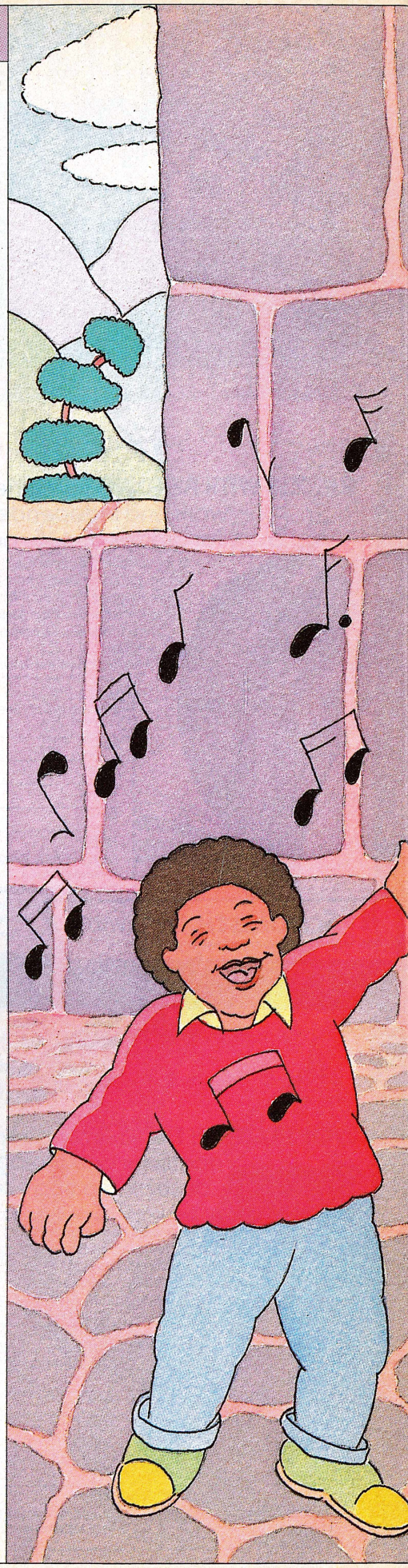
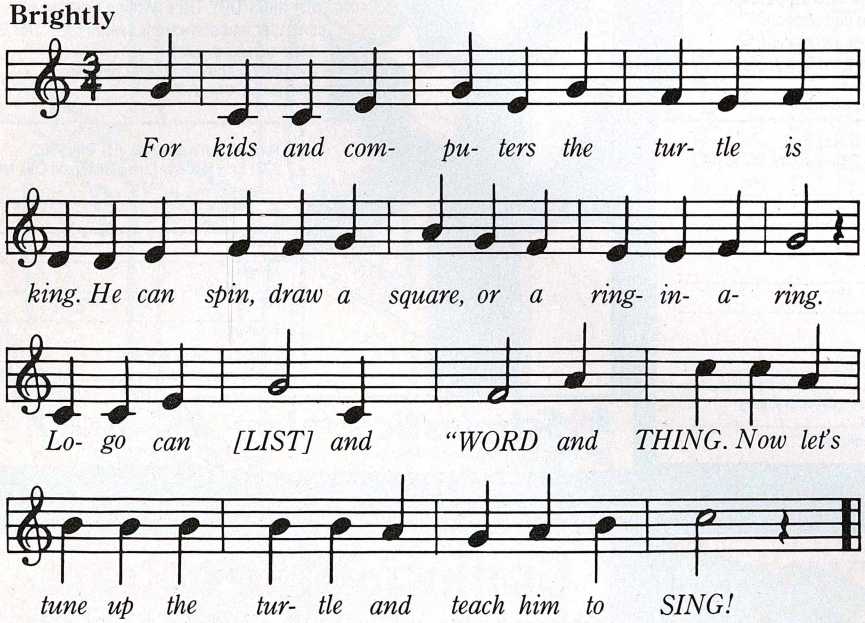


The Turtle Song

Brightly



TUNE UP THE TURTLE AND TEACH KIDS HOW TO MAKE MUSIC ON THE COMPUTER! ALL YOU NEED IS TERRAPIN OR COMMODORE LOGO AND THIS THREE-PART TEACHING UNIT.

Logo is a great tool for teaching science, mathematics, language arts, and social studies. But Logo instruction shouldn't stop there! It can be a powerful teaching tool in fine arts curricula, too.

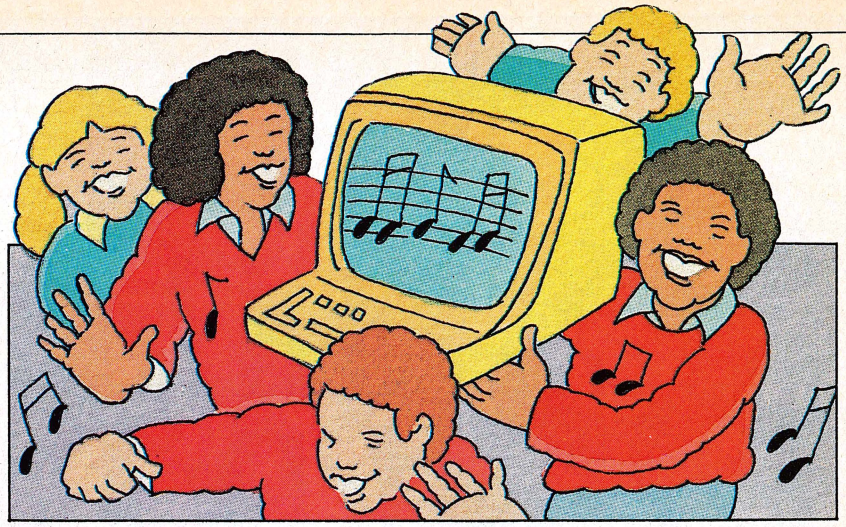
This music unit is proof. It uses Logo to teach three important music concepts: *duration* (the length of time a note is played), *rhythm* (the beat of a song), and *pitch* (how high or low a note sounds). By the end of the unit children will be able to use these concepts to transcribe and play a song on the computer.

The procedures in this teaching unit have been written for Commodore and Terrapin versions of Logo, but can be adapted for use with other versions that have music capability.

(continued)

Michael Donato

LESSON 1



DURATION

Objective: Students learn what whole notes, half notes, quarter notes, and eighth notes are. They work with a Logo program, titled *Notes*, that shows each kind of note on the screen.

Logo Prerequisites: None.

Music Prerequisites: None.

Preparation: Make a poster-size copy of the Rhythm Pyramid illustration on this page.

Load your Logo language disk into your computer. Remove the disk. Insert a blank disk. Type in and save the procedures that follow. Save them under the file name NOTES.

```
TO START
  CS HT PU SETX (-125) SETH 0 PD
END

TO WHOLE.NOTE
  REPEAT 10 [FD 3 LT 36]
END

TO HALF.NOTE
  WHOLE.NOTE FD 30 BK 30
END

TO QUARTER.NOTE
  HEAD FD 30 BK 30
END

TO EIGHTH.NOTE
  HEAD FD 27 RT 45
  REPEAT 4 [FD 4 RT 36]
  LT 210 REPEAT 4 [FD 4 LT 36]
  SETH 0 BK 27
END

TO EIGHTH.NOTES
  HEAD FD 30 RT 90 FD 15 LT 90
  BK 30 HEAD
END

TO QUARTER.REST
  RT 90 REPEAT 6 [FD 4 LT 36]
  RT 180 FD 8 LT 90 FD 8
  PU SETH 0 BK 25
END

TO HEAD
  REPEAT 10 [FD 3 LT 36]
  REPEAT 10 [FD 2 LT 36]
  REPEAT 10 [FD 1 LT 36]
END
TO MOVE
  PU RT 90 FD 15 LT 90 PD
END
```

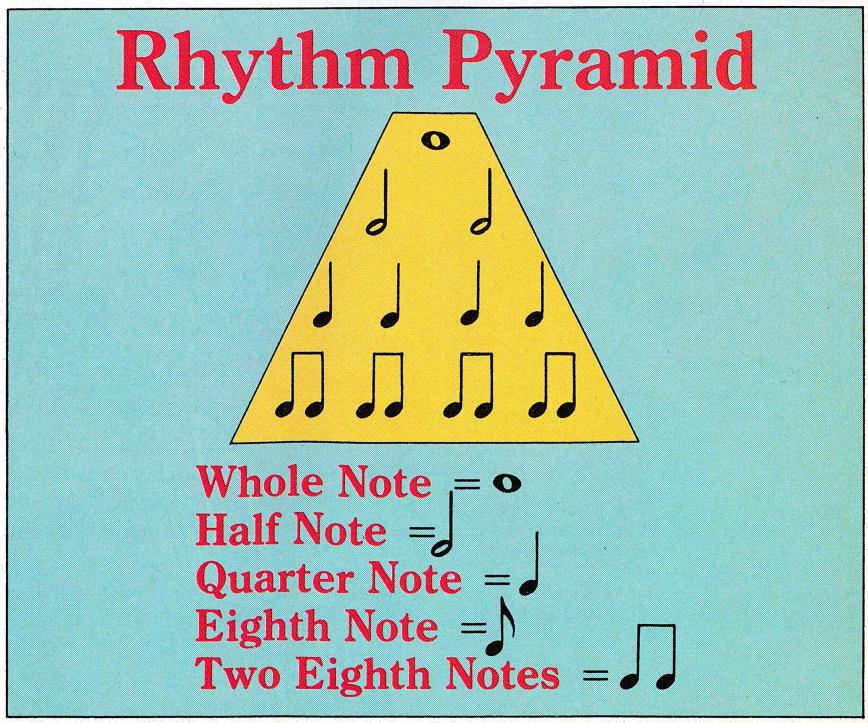
Just before presenting the lesson, load the *Notes* program into your computer and position the monitor so that everyone can see it. Type START QUARTER.NOTE MOVE and press RETURN to display a quarter note on the left side of the screen.

Activity: Explain to children that *notes* are symbols that stand for the tones (sounds) they hear in songs. A musical note can be played for a long time, a short time, or for some time in between. The length of time that a note is played is called its *duration.*

Notes of different durations are represented by different note symbols. Point to the note on the screen and explain that this note is called a *quarter note.* Clap one time and hum simultaneously. Tell kids to let this action stand for the duration of a quarter note.

Next, type HALF.NOTE MOVE and press RETURN to display a half note next to the quarter note. Point to the half note and explain that this note, called a *half note,* plays twice as long as a quarter note. Clap two times and hum simultaneously to demonstrate the duration of a half note.

Finally, type WHOLE.NOTE MOVE and press RETURN to display a whole note next to the half note. Explain that a *whole note* is two times longer than a half note and four times longer than a quarter note. If the quarter note gets one beat (clap) and the half note gets two beats, how many beats does the whole note get? *(Four.)* Clap four times and hum simultaneously to demonstrate the length of a whole note.



In Lesson One, students learn the names and relative durations of basic notes.

LESSON 2

RHYTHM

Objective: Students modify the *Notes* program (see Lesson 1) to make the computer play the rhythm of *The Turtle Song*, while displaying the pattern on the screen.

Logo Prerequisites: Students should be familiar with the commands FD, BK, LT, RT, REPEAT, and CS or DRAW. They should also know how to define and edit procedures.

Music Prerequisites: Students must be able to identify a whole note, half note, and quarter note, and must understand the term *duration*.

Preparation: Load a Commodore or Terrapin Logo language disk into your computer. Remove the disk. Then insert its corresponding utility disk into your disk drive. Type READ "MUSIC and press RETURN. After a few seconds, the disk will stop spinning. (Terrapin Logo users must then type SETUP and press RETURN.)

Remove the utility disk and insert the disk that contains the *Notes* program. Load the *Notes* program. Then type in the following three procedures for your version of Logo.

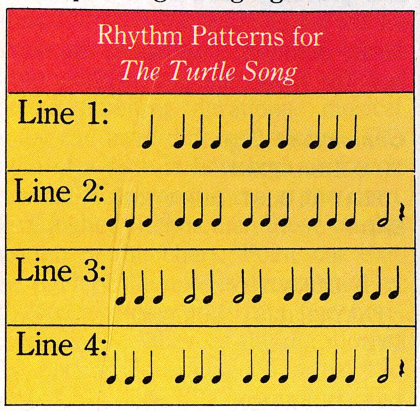
Commodore Logo

```
TO G :DURATION
  PLAY [7] (LIST :DURATION)
END

TO A :DURATION
  PLAY [9] (LIST :DURATION)
END

TO REST :DURATION
  PLAY [R] (LIST :DURATION)
END
```

Terrapin Logo

```
TO G :DURATION
  PLAY [3+] (LIST :DURATION)
END

TO A :DURATION
  PLAY [5+] (LIST :DURATION)
END

TO REST :DURATION
  PLAY [R] (LIST :DURATION)
END
```

Rhythm Patterns for *The Turtle Song*



Durations Chart: Terrapin Logo

Name of Note	Symbol	Logo Value (Medium Speed)	Logo Value (Slow Speed)
Whole Note	𝅝	160	200
Half Note	𝅗𝅥	80	100
Quarter Note	♩	40	50
Eighth Note	♪	20	25

Durations Chart: Commodore Logo

Name of Note	Symbol	Logo Value (Med. Speed)	Logo Value (Slow Speed)
Whole Note	𝅝	40	56
Half Note	𝅗𝅥	20	28
Quarter Note	♩	10	14
Eighth Note	♪	5	7

The G and A procedures allow you to play the notes G and A for a specified length of time. To run the procedures, type G or A, followed by a number that stands for its duration. The higher the number, the longer the note. For example, type G 160 to play a fairly long note. (More specific directions follow.)

The REST procedure allows you to make the computer rest, or pause, between notes for a specified period of time. For example, type REST 160.

Display a poster-size copy of: (1) the Durations Chart for your version of Logo, and (2) the Rhythm Patterns for *The Turtle Song*. (See illustrations, below.)

Activity: Show students the four rhythm patterns for *The Turtle Song* and explain that these notes represent the rhythm (or beat) of a song. Explain that each quarter note gets one beat, or clap. How many beats does the half note get? *(Two.)* Tell kids that the symbol at the end of the second and fourth rhythm patterns is called a *quarter rest*. It means to rest, or pause, for the same duration as a quarter note.

Point out that all but the first note in the song are in groups of three beats. Each group of notes is called a *measure*. (The first note, which is by itself, is called a *pick up* note. Two imaginary quarter rests preceed it to complete the measure.)

In each measure, the first note is *stressed*, or clapped with more emphasis, than the other notes. Clap out the first rhythm pattern. Then have students clap the first rhythm pattern with you.

Have the class clap the last three rhythm patterns. (Patterns 2 and 4 are identical.)

Tell students that their job is to make the computer display these rhythm patterns in musical notation while playing them.

Show students the Durations Chart for your version of Logo. Explain that the Logo values on the right tell the computer how long to play the note. The higher the number, the longer the note. Point out that, in both columns of Logo values (medium and slow speed), the number for the half note is half the number for the whole note; the number for the quarter note is one fourth the number for the whole note; and the number for the eighth note is one eighth the number for the whole note.

What if you changed the number for the whole note to 200? What would be the number for the half note? *(100.)* For the quarter note? *(50.)* Explain that by increasing all the numbers for the duration in this manner, you can make each note play a little longer, which makes a song play slower. Decreasing the duration values makes the song play faster.

Review these four notes by hav-

ing the class clap and hum each one. Ask students how many quarter notes it takes to equal a half note. *(Two.)* How many half notes does it take to equal a whole note? *(Two.)* How many quarter notes equal a whole note? *(Four.)*

If you are working with intermediate level students, introduce eighth notes as well. Eighth notes are one eighth the duration of a whole note and half as long as a quarter note. (Two eighth notes equal one quarter note.) To display a single eighth note on the screen, type EIGHTH.NOTE MOVE and press RETURN. To display two eighth notes, type EIGHTH.NOTES MOVE and press RETURN.

To remind students what the relative durations of the notes are, display a rhythm pyramid on the wall (see illustration on page 40)

Challenge advanced programmers to draw the rhythm pyramid on the screen, using the procedures in the *Notes* program.

Next, demonstrate how to draw and play a quarter note on the computer by typing START QUARTER .NOTE G 40 (Terrapin) or START QUARTER.NOTE G 10 (Commodore) and pressing RETURN. (Explain that the START procedure places the turtle on the left side of the screen.) Ask students how they would draw and play a half note. Do so by typing MOVE HALF.NOTE G 80 (Terrapin) or MOVE HALF.NOTE G 20 (Commodore) and pressing RETURN. (Explain that the MOVE procedure positions the turtle for the next note.)

Tell students that the computer also knows another note, called A. Type MOVE QUARTER.NOTE A 40 (Terrapin) or MOVE QUARTER.NOTE A 10 (Commodore) and press RETURN.

Have students write procedures to draw and play the rhythm patterns for *The Turtle Song.* Tell them to use the note called A to play those notes that are stressed and to use the note called G to play those notes that are not stressed. Also, tell them to use the Logo duration values for medium speed (see Durations Chart).

Have students run their procedures and clap the rhythms as the computer plays them.

Challenge advanced musicians to change the durations of the notes in the procedures to speed up or slow down the rhythms. (Remind them that the duration of the notes must still be in proportion. That is, a quarter note must still be half as long as a half note.)

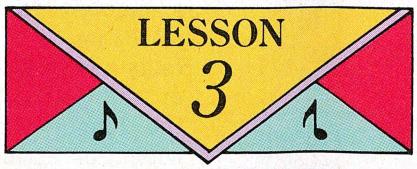
Answers: Here is a sample solution to the activity. Students' procedures will vary.

Terrapin Logo

```
TO RHYTHM1
  START QUARTER.NOTE MOVE MOVE
  REPEAT 3 [QUARTER.NOTE MOVE]
  MOVE REPEAT 3 [QUARTER.NOTE
MOVE]
  MOVE REPEAT 3 [QUARTER.NOTE
MOVE]
  G 40 REPEAT 3 [A 40 G 40 G 40]
END

TO RHYTHM2
  START
  REPEAT 4 [REPEAT 3 [QUARTER.NOTE
MOVE] MOVE]
  HALF.NOTE MOVE QUARTER.REST
  REPEAT 4 [A 40 G 40 G 40]
  A 80 REST 40
END

TO RHYTHM3
  START REPEAT 3 [QUARTER.NOTE
MOVE]
  MOVE REPEAT 2 [HALF.NOTE MOVE
QUARTER.NOTE MOVE MOVE]
  REPEAT 3 [QUARTER.NOTE MOVE]
  A 40 G 40 G 40
  REPEAT 2 [A 80 G 40]
  A 40 G 40 G 40
END

TO RHYTHM4
  RHYTHM2
END
```

Commodore Logo

Divide all duration values in the Terrapin Logo version by 4. For example, A 40 becomes A 10. The procedures are otherwise identical.



PITCH AND MELODY

Objective: Students program the computer to play a C-major scale. They then use the notes in the scale to play the melody to *The Turtle Song* (page 38) on the computer.

Logo Prerequisites: Students must know how to define and edit procedures. They must also know how to play the notes G and A for a specified duration (see Lesson 2).

Music Prerequisites: Students must be able to recognize rhythm patterns. They must also understand the music terms *duration, measure,* and *beat.*

Preparation: Before presenting the lesson, load a Commodore or Terrapin Logo language disk into your computer. Remove it, insert its utility disk, and read or load the music procedures. Remove this disk and insert the disk with the *Notes* program (including the G and A procedures from Lesson 2). Load the *Notes* program.

Add the following procedures to the program and save them on a disk. The procedures allow students to play the notes C, D, E, F, G, A, B, and high C by pressing certain keys on the keyboard. For example, they can hear the note "D" by typing D 20 and pressing RETURN. ("D" stands for the letter of the note; "20" stands for its duration. The higher the number, the longer the duration.)

Commodore Logo

```
TO C :DURATION
  PLAY [0] (LIST :DURATION)
END

TO D :DURATION
  PLAY [2] (LIST :DURATION)
END

TO E :DURATION
  PLAY [4] (LIST :DURATION)
END

TO F :DURATION
  PLAY [5] (LIST :DURATION)
END

TO B :DURATION
  PLAY [11] (LIST :DURATION)
END

TO C1 :DURATION
  PLAY [12] (LIST :DURATION)
END

TO REST :DURATION
  PLAY [R] (LIST :DURATION)
END
```

Terrapin Logo

```
TO C :DURATION
  PLAY [8] (LIST :DURATION)
END

TO D :DURATION
  PLAY [10] (LIST :DURATION)
END
```

```
TO E :DURATION
  PLAY [12] (LIST :DURATION)
END

TO F :DURATION
  PLAY [1+] (LIST :DURATION)
END

TO B :DURATION
  PLAY [7+] (LIST :DURATION)
END

TO C1 :DURATION
  PLAY [8+] (LIST :DURATION)
END

TO REST :DURATION
  PLAY [R] (LIST :DURATION)
END
```

Make a poster-size copy of the C-Major Scale Chart at right. Make a worksheet-size copy of the C-major scale for each student.

Activity: Show students the C-major scale poster. Explain that, besides having different durations, musical notes can have different *pitches*. The pitch of a note is how high or low it sounds. Notes on the top of the chart have higher pitches than those on the bottom of the chart. Point out that the pitch of the note is determined by its location on a *staff* (the five horizontal lines), whereas the duration of the note is determined by what the note looks like. (The notes on the chart are all quarter notes.)

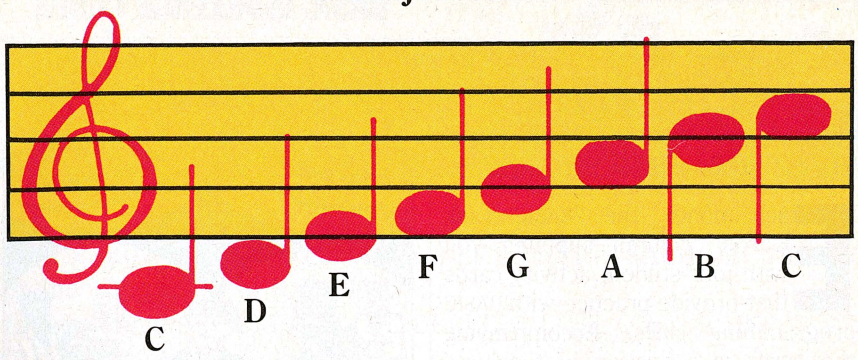
Besides having different locations on the staff, notes with different pitches have different names. On this chart, the names of the notes in order from lowest to highest are: C, D, E, F, G, A, B, C.

Remind students that in the previous lesson on rhythm, they programmed the computer to play the notes G and A. Ask students to locate these notes on the chart. *(They are the fifth and sixth notes.)*

Tell students that their job will be to program the computer to play all eight notes on the chart, in order. (See "Answers" for a sample solution.) Explain that, when they are finished, they will have programmed the computer to play a *C-major scale*. (A C-major scale is a series of eight notes, starting and ending with the note C, that increase progressively in pitch.)

Explain that by putting these notes together in different orders and with different durations, you can produce

C-Major Scale



A C-major scale is a series of eight notes that starts and ends with the note C. The notes increase in pitch as you go up the scale.

melodies, or songs. Show students the music and words to *The Turtle Song* (page 38). Point out that the song is made up of quarter notes and half notes with different pitches. Ask them how many beats are in each measure. *(Three.)* Explain that the "3" part of the "3/4" stands for three beats per measure. (The "4" means that the quarter note gets one beat.)

Using the C-Major Scale Chart for reference, ask students what the name of the first note of the song is. *(G.)* How about the second and third notes? *(C.)* The fourth note? *(E.)*

Pass out a copy of *The Turtle Song* and the C-major scale to each child and tell students to write a procedure that makes the computer play the song. Point out that the second and fourth lines have a quarter rest at the end. The procedure to play a rest is called REST and must be followed by a number for duration. (Remember: a quarter rest has the same duration as a quarter note.)

Advanced programmers can also use PRINT statements to display the words on the bottom of the screen and the notes on the top, while the computer plays the melody.

When students have finished, ask them to demonstrate their procedures for playing *The Turtle Song*. Have them sing the words as the computer plays the melody.

Answers: (1) Here are sample procedures for making the computer play a C-major scale (with nonvariable and variable duration). Students' procedures might vary slightly.

Commodore and Terrapin Logo

```
TO C.SCALE.Q
  C 40 D 40 E 40 F 40 G 40
  A 40 B 40 C1 40
END
```

```
TO C.SCALE :DURATION
  C :DURATION
  D :DURATION
  E :DURATION
  F :DURATION
  G :DURATION
  A :DURATION
  B :DURATION
  C1 :DURATION
END
```

(2) Here are sample procedures for playing the melody of *The Turtle Song*. Each line represents a measure. Students' procedures might vary slightly.

Terrapin Logo

```
TO TURTLE.SONG
  G 40
  C 40 C 40 E 40
  G 40 E 40 G 40
  F 40 E 40 F 40
  D 40 D 40 E 40
  F 40 F 40 G 40
  A 40 G 40 F 40
  E 40 E 40 F 40
  G 80 REST 40
  C 40 C 40 E 40
  G 80 C 40
  F 80 A 40
  C1 40 C1 40 A 40
  B 40 B 40 B 40
  B 40 B 40 A 40
  G 40 A 40 B 40
  C1 80 REST 40
END
```

Commodore Logo

Divide all the duration values in the Terrapin version by 4. For example, C1 80 becomes C1 20. The procedure is otherwise identical.

Dee Miller teaches music and Logo to grades K through six at St. James Day School in Texarkana, TX. ■

Editing/Top-Down Programming

BY SANDRA MARKLE

Each month, the "BASIC Task Cards" column supplies you with four student activity cards that provide practice with BASIC programming skills. Accompanying the cards is a section of teachers' notes that defines concepts and commands introduced on the cards. The notes also supply teaching objectives and answers for the card activities.

Cut out and laminate the Beginner task cards (numbers 9 and 10) on page 45 and the Intermediate task cards (numbers 9 and 10) on page 47. Direct each student to the task cards that correspond to his or her level of programming expertise.

BEGINNER TASK CARD COMMANDS AND CONCEPTS

To correct or change a program, programmers use special commands and editing techniques. The program that follows is supposed to display the answer to the math problem 6+6, but it has an error in line 20:

```
NEW
10 PRINT "6"
20 PRIT "+6"
30 PRINT "="
40 PRINT 6+6
50 PRINT "THIS IS AN ADDITION PROBLEM."
60 END
```

Enter the program as is into your computer and run it. The computer will display 6 on the screen (line 10). It will then display a SYNTAX ERROR message. The error message is a result of the misspelled PRINT command in line 20.

To correct the error, type LIST 20 and press RETURN or ENTER. The computer will list only line 20. Retype line 20 correctly so that it reads: 20 PRINT "+6". Run the program again. It now works.

To delete a line from the program, you simply type the line number and press RETURN or ENTER. For example, type 50 and press RETURN or ENTER. Type LIST and press RETURN or ENTER to see the revised program listing on the screen.

The LIST command is also useful for listing a specific portion of a program. For example, type LIST 20-30 to display lines 20 and 30 on the screen. Type LIST 20- to display lines 20 to the end of the program. And, type LIST -30 to display the beginning of the program to line 30.

If you are using an Atari or a Commodore computer, you can edit commands without having to retype the whole statement. First list the line you want to edit on the screen. Then use the arrow keys to move the cursor to the character in the statement that you want to change. To add a character, press the INSERT key and type the character. To delete the character to the left of the cursor, press the DELETE key. After making the change, press RETURN.

If you are using a TRS-80 computer, you can use the EDIT command to change program lines easier than with LIST. For example, to edit line 30 of the sample addition program, type EDIT 30, and press ENTER. This will appear on the screen: 30 PRINT "=". Use the space bar to move the cursor to the very end of the line. Press the "I" key (for insert) and type a semicolon. Then press ENTER to exit the edit mode. Run the program again. This time, the answer to the problem is displayed on the same line as the equal sign.

INTERMEDIATE TASK CARD CONCEPTS

Just as a good paragraph has a topic sentence followed by supporting details, a well-organized BASIC program has a main routine followed by supporting subroutines. (For information on how to create subroutines, see last month's "BASIC Challenge Cards.")

When you organize a program in this way, you are using a *top-down* program design. To write a program with top-down design, follow these steps:

1. Write a step-by-step outline in English of what the program should do. Here is a sample outline for a program that asks the user for his or her name and age, and then comments on the user's age.

I. Ask user for his or her name.
II. Ask user for his or her age.
III. Tell user it is hard to believe he or she is the age that was input.

2. Use your outline to write a main routine. The main routine of a program is a series of BASIC line statements that provides an overview of the whole program. Here is one way to write the main routine for the *Name and Age* program.

```
10 REM NAME AND AGE PROGRAM
20 GOSUB 100: REM NAME
30 GOSUB 200: REM AGE
40 PRINT "IT'S HARD TO BELIEVE YOU ARE ";B;" YEARS OLD, ";A$;"."
50 END
```

The two GOSUB commands in lines 20 and 30 send control of a program to different subroutines. Writing subroutines is the next step in top-down programming.

3. Write the subroutine or subroutines. A subroutine provides the precise steps for solving a smaller job within a program. Subroutines generally follow the main routine and often include a REM statement at the beginning of the subroutine and a RETURN command at the end.

Here is one way to write the first subroutine for the *Name and Age* program.

```
100 REM NAME
110 PRINT "WHAT IS YOUR NAME?"
120 INPUT A$
130 RETURN
```

(continued on page 46)

Bill Silbert

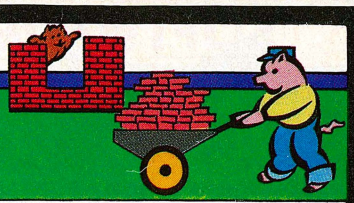
CUT OUT AND LAMINATE

BEGINNER

9

BASIC TASK CARD

A Pig-Tale



The program at right is supposed to display the story of the Three Little Pigs. First, however, it needs a few changes. Enter the program into your computer. Then make these changes:

1. Delete each line that doesn't belong in the story. Then type LIST and press RETURN or ENTER to see the new program.
2. Decide where the following PRINT statements fit into the program. Then give them line numbers and type them into the computer.

_____PRINT "THE BIG BAD WOLF BLEW DOWN THE STRAW HOUSE."

_____PRINT "THE BIG BAD WOLF BLEW DOWN THE STICK HOUSE."

3. Find and correct the two bugs in the program.
4. Write an ending for the story and add it to the program. Run the program to see the story.

```
NEW
10 PRINT "THE 3 LITTLE PIGS EACH DECIDED TO
BUILD A HOUSE."
20 PRINT "CINDERELLA LOST ONE OF HER GLASS
SLIPPERS."
30 WRITE "THE FIRST PIG BUILT HIS HOUSE OUT
OF STRAW."
40 PRINT THE SECOND PIG BUILT HIS HOUSE OUT
OF STICKS."
50 PRINT "SNOW WHITE TOOK A BITE OF THE
WITCH'S APPLE."
60 PRINT "MARY'S LAMB FOLLOWED HER TO
SCHOOL."
70 PRINT "THE THIRD LITTLE PIG BUILT HIS
HOUSE OUT OF BRICKS."
80 END
```

ANSWER: Check your program with your teacher.

BEGINNER

10

BASIC TASK CARD

HANDS ON EDITING

This program is supposed to display a word search puzzle on the screen. The words in the puzzle are all things that you can do with your hands. To make the program work, enter it into your computer and make these changes:

1. Replace lines 20 and 60 with these lines:

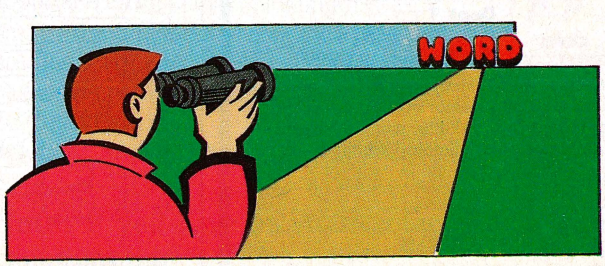
```
20 PRINT "R D A C A T C H O C"
60 PRINT "N P C L A P E P Q C"
```

2. Insert this line between lines 40 and 50:

_____PRINT "E A U E W A P A M T"

3. Delete lines 15 and 35.
4. Find three programming bugs and correct them.
5. Print out or copy the program on paper. Check it with your teacher. Can you find 13 actions that you can do with your hands?

```
NEW
10 TYPE "W P O I N T X O P S"
15 PRINT "X T N B M W R I V S"
20 PRINT "X E T R G H B N O I"
30 PRINT I S R T A P T S K R"
35 PRINT "G N W R Y I O X D F"
40 PRINT "T L D A V B Y N E A"
50 PRINT "Z E T Y J V B M E Q"
60 PRINT "G K T O U C H J N H"
70 PRINT END
```



ANSWER: Check your program with your teacher.

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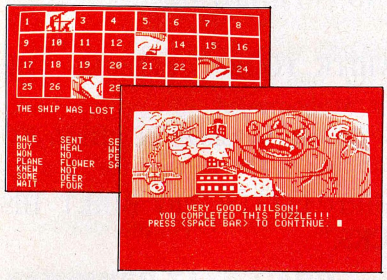

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BASIC CHALLENGE CARDS

(continued from page 44)

The second subroutine could be written like this:

```
200 REM AGE
210 PRINT "HOW OLD ARE YOU?"
220 INPUT B
230 RETURN
```

Here is what the entire program looks like.

```
10 REM NAME AND AGE PROGRAM
20 GOSUB 100: REM NAME
30 GOSUB 200: REM AGE
40 PRINT "IT'S HARD TO BELIEVE YOU ARE ";B;" YEARS OLD, ";A$"."
50 END
100 REM NAME
110 PRINT "WHAT IS YOUR NAME?"
120 INPUT A$
130 RETURN
200 REM AGE
210 PRINT "HOW OLD ARE YOU?"
220 INPUT B
230 RETURN
```

USING THE TASK CARDS

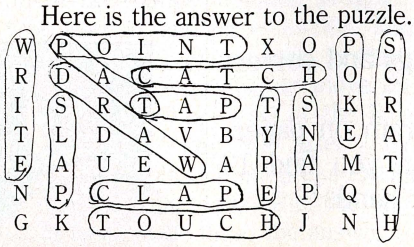
Here are the teaching objectives and answers for each of the four BASIC task cards.

Beginner Task Card #9: Students edit a program that displays the story of the Three Little Pigs. *Answers:* (1) Delete lines 20, 50, and 60; (2) Insert the first PRINT statement as line 35 and the second as line 45; (3) Change WRITE to PRINT in line 30 and insert the first quotation mark in line 40; (4) Answers will vary.

Beginner Task Card #10: Students edit a program that displays a word search puzzle. *Answers:* Here is the edited word search program.

```
10 PRINT "W P O I N T X O P S"
20 PRINT "R D A C A T C H O C"
30 PRINT "I S R T A P T S K R"
40 PRINT "T L D A V B Y N E A"
45 PRINT "E A U E W A P A M T"
50 PRINT "N P C L A P E P Q C"
60 PRINT "G K T O U C H J N H"
70 END
```

Here is the answer to the puzzle.



Intermediate Task Card #9: Students write a program of top-down design that displays the words to the song, *Oh, Susanna!*. *Answer:*

```
10 REM OH, SUSANNA!
20 GOSUB 1000:REM CHORUS
30 GOSUB 2000:REM VERSE
40 GOSUB 1000:REM CHORUS
50 END
1000 REM CHORUS
1010 PRINT "OH, SUSANNA! OH, DON'T YOU CRY FOR ME."
1020 PRINT "I'VE COME FROM ALABAMA WITH MY BANJO ON MY KNEE."
1030 RETURN
2000 REM VERSE
2010 PRINT "I CAME FROM ALABAMA WITH MY BANJO ON MY KNEE."
2020 PRINT "I'M GOING TO LOUISIANA, MY TRUE LOVE FOR TO SEE."
2030 PRINT "IT RAINED ALL NIGHT THE DAY I LEFT,"
2040 PRINT "THE WEATHER IT WAS DRY;"
2050 PRINT "THE SUN SO HOT I FROZE TO DEATH;"
2060 PRINT "SUSANNA DON'T YOU CRY."
2070 RETURN
```

Intermediate Task Card #10: Students use top-down programming to complete a program listing. The program is a number game. *Answer:*

```
20 INPUT SN
30 HOME (Apple), CLS (Radio Shack), PRINT CHR$(125) (Atari), or PRINT CHR$(147) (Commodore)
50 IF Q>10 THEN GOSUB 2000:GOTO 200
70 INPUT N
80 IF N=SN THEN GOSUB 3000:GOTO 200
90 GOSUB 1000
210 INPUT A$
230 END
1030 RETURN
2020 PRINT "THE SECRET NUMBER IS ";SN;"."
2030 RETURN
3030 PRINT Q;" GUESSES."
3040 RETURN
```

Sandra Markle is the author of several computer books for children, including *Computer Tutor Junior* (Learning Works, Santa Barbara, CA) and *The Programmer's Guide to the Galaxy* (Lothrop, Lee, and Shepard; New York, NY). She and her husband William Markle are coauthors of *In Search of Graphics* (Lothrop, Lee, and Shepard). ■

CUT OUT AND LAMINATE

INTERMEDIATE

9

BASIC TASK CARD

SING ALONG

The American folk song *Oh, Susanna!* was written by Stephen Foster in the mid-1800s. Follow these steps to write a program that displays the chorus, the verse, and then the chorus again to *Oh, Susanna!*

1. On a sheet of paper, write a step-by-step outline in English that tells what the program will do.

2. On the computer, write a subroutine that uses PRINT statements to display the chorus to the song. Then write another subroutine to display the verse. (See words at right.)

3. Fill in the missing parts of this main routine and type it into the computer.

```
NEW
10 REM OH, SUSANNA!
20 _____:REM CHORUS
30 _____:REM VERSE
40 _____:REM CHORUS
50 _____:REM END PROGRAM
```

4. Arrange the main routine and the two subroutines you wrote into a program; then run it.

Oh, Susanna!

Chorus:

Oh, Susanna! Oh, don't you cry for me;
I've come from Alabama with my banjo on my knee.

Verse:

I came from Alabama with my banjo on my knee.
I'm going to Louisiana, my true love for to see.
It rained all night the day I left,
The weather it was dry;
The sun so hot I froze to death;
Susanna don't you cry.

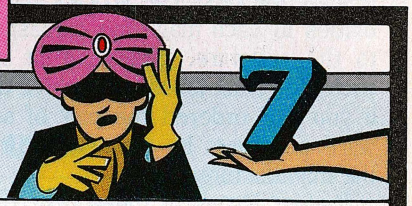
ANSWER: Check your program with your teacher.

INTERMEDIATE

10

BASIC TASK CARD

SECRET NUMBERS



In the *Guesser* program (listed below), you enter a secret number into the computer and a friend tries to guess what it is. Before the program can work, however, you must add a few commands. Fill in each blank in the listing, then type in and run the program to make sure it works.

```
NEW
0 REM GUESSER
10 PRINT "ENTER A SECRET NUMBER."
20 _____:REM ACCEPT NUMBER (SN)
30 _____:REM CLEAR THE SCREEN
40 Q=0:REM Q=NUMBER OF GUESSES
50 IF Q>10 THEN _____:REM EXIT TO LOSER SUBROUTINE
THEN GO TO LINE 200
60 PRINT "ENTER YOUR GUESS."
70 _____:REM ACCEPT GUESS (N)
80 IF N=SN THEN_____:REM EXIT TO WINNER SUBROUTINE
THEN GO TO LINE 200
90 _____:REM EXIT TO HIGH OR LOW SUBROUTINE
100 Q=Q+1:REM RUNNING TOTAL OF GUESSES
110 GOTO 50
200 PRINT "DO YOU WANT TO PLAY AGAIN (Y/N)?"
210 _____:REM ACCEPT ANSWER (A$)
220 IF A$="Y" THEN Q=0:GOTO 10
230 _____:REM END MAIN ROUTINE
1000 REM TOO HIGH OR LOW
1010 IF N<SN THEN PRINT "TOO LOW!"
1020 IF N>SN THEN PRINT "TOO HIGH!"
1030_____:REM END OF SUBROUTINE
2000 REM LOSER
2010 PRINT "YOU'RE OUT OF GUESSES."
2020 PRINT "THE SECRET NUMBER IS ";_____
2030 _____:REM END OF SUBROUTINE
3000 REM WINNER
3010 PRINT "GREAT! YOU GOT THE NUMBER IN"
3030 PRINT _____;" GUESSES."
3040 _____:REM END OF SUBROUTINE
```

Note: If you have an Atari computer, add this line: 1 DIM A$(3)

ANSWER: Check your program with your teacher.

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Recent issues of these magazines have contained the software programs *MECC Writer, Kidwriter, ChipWits, Troll's Tale, Alice in Wonderland,* and *Below the Root.* A supplement for teachers accompanies each issue. It includes topics for class discussion, exercises that can be worked on before kids attempt the accompanying software (such as prewriting activities), and other ideas to help make the most of each issue. A new issue of each magazine is published approximately once a month.

Price: *$199 includes a seven-issue subscription to one of the two magazines, complete with two disks per issue, a teacher's guide, and a current issue of Bank Street Software Letter for Parents and Other Users.* Contact: *Sturges Publishing Co., 300 Alexander Park, Princeton NJ 08540.*
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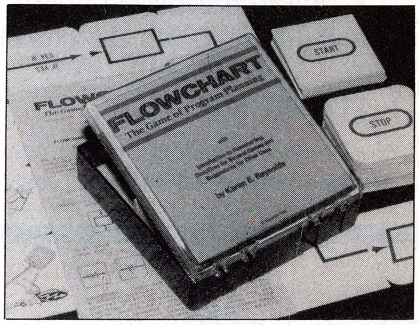

Price: *$10 each, plus $1.50 shipping charges for one game and .40 for each additional game. (California residents add tax.)* Contact: *Ampersand Press, 691 26th St., Oakland, CA 94612; 415/832-6669.*
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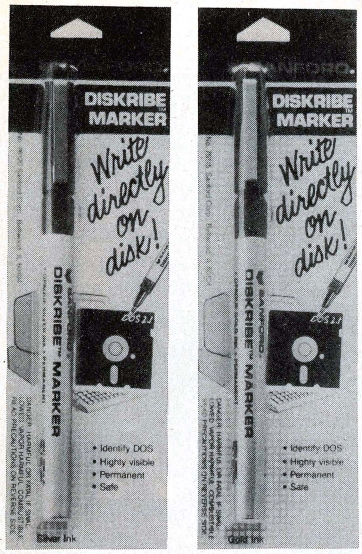

black, red, and blue, and has an extra-fine point that makes writing easier to read on small labels. Price: *$2.50 for Diskribe; $1 each for the Label Pen.* Contact: *Sanford Corp., 2740 Washington Blvd., Bellwood, IL 60104; 312/547-6650.*
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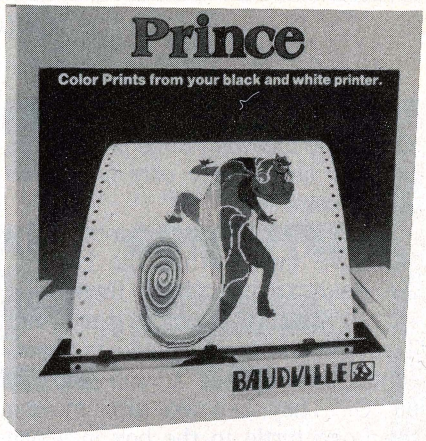
Black and white printers with removable ribbons, like the ImageWriter, Epson MX, FX, or RX 80, Apple dot matrix, Prowriter, or NEC8023, are capable of all color functions. Other printers equipped with permanent ribbons are capable



of all color printing functions except transferring.

Prince handles the printer controls, such as sizing, color separation, and paper alignment. All the user must do is plug in each ribbon as prompted. The entire process takes a total of about 15 minutes.
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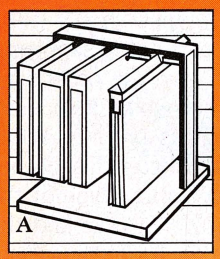

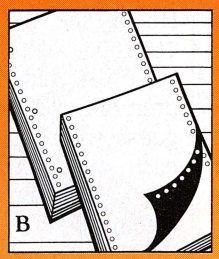

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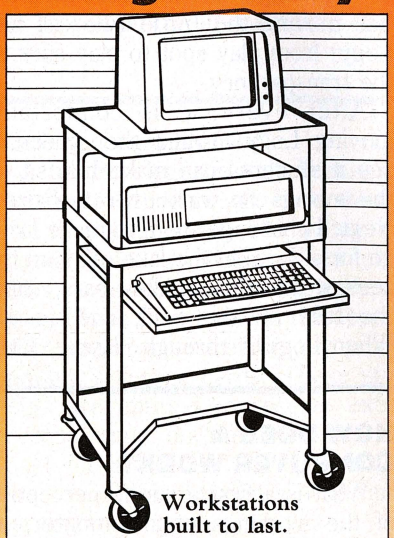

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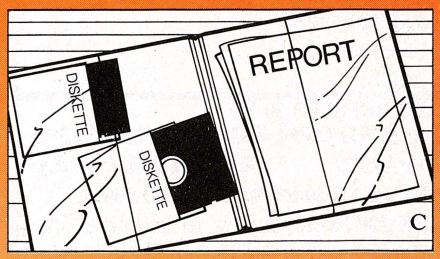

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MICRO IDEAS

QUICK COMPUTER TIPS AND ACTIVITIES

TIC-TAC-TOE WITH LOGO

Use the following Logo procedures to allow students to play tic-tac-toe on the computer.

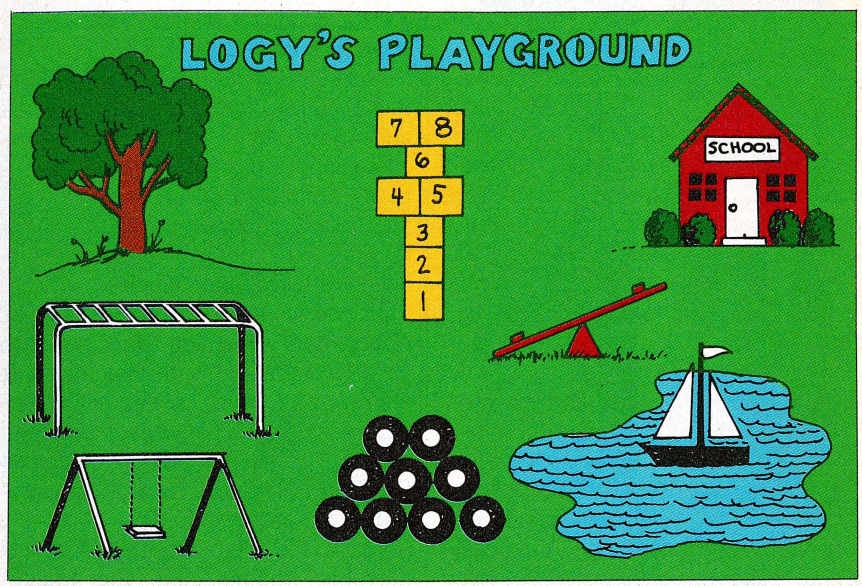
Type in all six procedures below and save them. When the children are ready to play, have them type TICTAC. This will draw the game grid. Two players decide between themselves who will be "X" and who will be "O." They then take turns moving the Logo turtle to the box in which they want to place their symbol. Remind children to use the command PU (PENUP) before they move the turtle, and PD (PENDOWN) before they try to enter their symbol in the box.

To enter the symbols, children need only press the letter "O" on the keyboard to form an O, or the letter "X" on the keyboard to make an X. Because it is difficult to get the characters exactly in place, approximate placements should be accepted.

I have found this game to be a big help in getting students into the habit of using the Logo commands PENUP (PU) and PENDOWN (PD), depending on whether they want the turtle to leave a trail behind it or not.

```
TO TICTAC
  PU SETX (-40) SETY 0
  PD BK 60 FD 160
  PART2
  PART3
  PART4
  PU HOME FD 10 PD
END
TO PART2
  BK 80 FD 20 RT 90 BK 60 FD 160
  BK 120 FD 160
END
TO PART3
  BK 60 LT 90 FD 60 BK 160
END
TO PART4
  FD 50 RT 90 FD 60 BK 200
END
TO X
  SETH 45 FD 20 BK 40 FD 20
  SETH 315 FD 20 BK 40
END
TO O
  REPEAT 36 [FD 3 RT 10]
END
```

Joanne Davis
New York, NY



A sample design for the transparency that becomes Logy's "playground."

TURN YOUR LOGO SCREEN INTO A PLAYGROUND

For students who are beginning to feel comfortable with Logo, I have devised a game that allows them to practice their Logo skills *and* use their imagination at the same time.

First, I draw the outline of a school playground (like the one on this page) onto a blank tranparency. I tape the transparency to a computer screen, boot up Logo, and let students practice moving the turtle (we call him Logy) from play spot to play spot on the transparency.

After everyone is comfortable moving Logy around the screen, I see if students can make him sit on the swings or walk over the tires. Next, I challenge them to make Logy go for a swim in the lake, play on the seesaw and the monkey bars, climb the tree on the field, and so on. When Logy is through playing, I tell kids to return him to the schoolhouse.

After the children have played with Logy, I have them boot up a word processing program and write a story about all the things that their turtle did during recess.

Another game that can be played with the playground transparency is Hide-and-Seek. Have one student put (hide) Logy somewhere on the playground, when no one else is looking. He or she then types in HT (HIDE TURTLE), and the turtle disappears. Have the "hider" give the other children oral clues that would help them guess where Logy is playing. When each student has written his or her guess on a slip of paper, type in the command ST (SHOW TURTLE) and the turtle will appear in its hiding place. How many students were right?

Joan Marcello
Rochester, NY

HOW DOES A COMPUTER WORK?

What is a first grader's perception of the workings of a computer, as compared to that of a fifth or sixth grader? Give students in an upper and a lower grade a chance to show you. Then use the results to design a comparative bulletin board.

Ask students in the two grade levels you select to draw a picture of what they think the inner workings of a computer look like. Tell them to show as precisely as they can how the parts make the computer work. Ask students with some of the most creative attempts to present their work to the other students.

Hang all of the students' works on a bulletin board labeled "Inside of My

Computer. . . ." Organize them according to grade level.

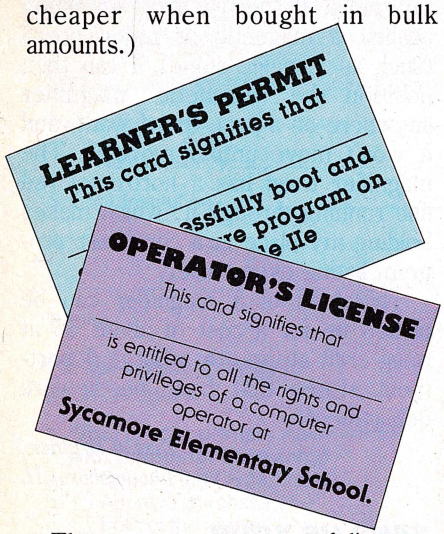
As a follow-up activity, have a group of upper level students use reference books to draw the actual insides of a computer on posterboard. Have the kids label the main parts (CPU, RAM and ROM chips, input/-output ports, and power supply). Then have these researchers explain to both upper and lower grade children how these parts work. (One good reference for this activity is the poster in the October 1984 issue of *Teaching and Computers.*)

William DiSisto
West Springfield, MA

COMPUTER LICENSES

Your students may be too young for an automobile operator's license, but it's never too early for them to apply for a computer operator's license!

At a local printing company, I had business cards made up that entitle holders to all the rights and privileges of an official classroom computer operator. (Try to find other teachers willing to chip in, as the cards are cheaper when bought in bulk amounts.)

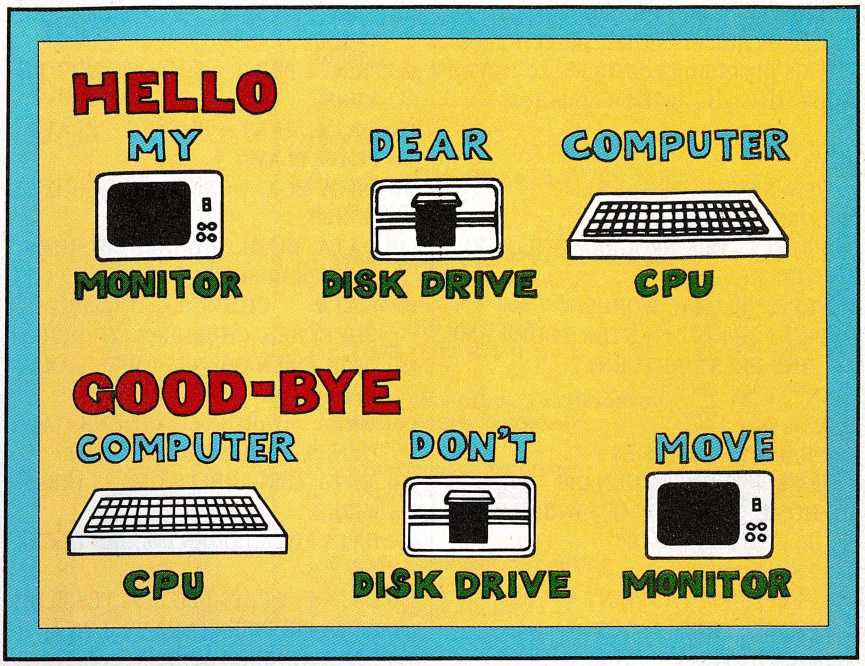


There are two types of licenses distributed in my classroom: a learner's permit and a driver's license. To obtain a learner's permit, a student must successfully boot and run a piece of software on the computer. Holders of learner's permits are allowed access to the computer station by themselves, but they are not qualified to act as tutors to other students working toward licenses.

A full-privelege driver's license is awarded to students who have shown that they can create and debug an original BASIC program. When students successfully demonstrate these skills, I type their name in the appropriate space on one of the computer operator's license cards. These students are entitled to receive extra personal time on the computer as "pay" for acting as "driving instructors" to other students who are learning to program.

Students love to display their computer credentials to parents and friends. The card is a real status symbol in my class.

Michael Carlsson
Philadelphia, PA



TURNING THE COMPUTER ON AND OFF

To assure that the power is turned on and off correctly on your Commodore 64 systems, have students "talk" to their system.

Before they begin work, they should greet the computer by saying, "**M**y **D**ear **C**omputer." The greeting is a reminder for students to turn on the **m**onitor, **d**isk drive, and **C**PU (main computer device) — in that order (based on the first letter of each word).

Before they leave the computer station, children say, "**C**omputer, **D**on't **M**ove!" This admonition is actually a reminder to children that they should turn the computer system's power off in reverse order: CPU, disk drive, monitor.

We have a bulletin board display (pictured above) that helps remind us of this reminder!

Elaine Buckshaw
Holbrook, NY

PLURAL WORDS PROGRAM (APPLE SERIES)

How well do your students convert the singular of words into their plural? Test kids' ability with this short program.

The program asks students to choose the correct plural spellings for 10 words. For each of these words, they are given three spellings to choose from. For example, students must figure out whether the plural of *lock* is *lockes*, *lockz*, or *locks*. Students are corrected if they give the wrong answer, and rewarded with "good work!" or "terrific!" if they give the right answer. At the end of the program, children are given their score — the computer calculates the

(continued)

number right and the number wrong, and gives students their percentages.

This program is designed to run on Apple II+, IIe or IIc computers.

```
NEW
10 REM REVIEW OF PLURALS
20 HOME : CLEAR
30 PRINT " THIS PROGRAM WILL HELP
    YOU REVIEW"
40 PRINT "PLURAL WORDS."
50 PRINT : PRINT " ENTER YOUR NAME
    AND PRESS [RETURN]."
60 INPUT N$
70 Q = Q + 1
80 READ A$,B$,C$,D$,E$
90 IF A$ = "DONE" THEN 240
100 HOME : PRINT " (";Q;") WHICH WORD
    IS THE PLURAL OF"
110 PRINT A$;"?"
120 PRINT : PRINT : PRINT "  ";B$
130 PRINT : PRINT "  ";C$
140 PRINT : PRINT "  ";D$
150 PRINT : PRINT : PRINT " TYPE IN
    THE CORRECT WORD AND PRESS"
160 PRINT "[RETURN]."
170 INPUT R$
180 IF R$ < > E$ THEN PRINT : PRINT "
    WRONG. THE ANSWER IS ";E$;".":
    GOTO 220
190 W = INT (5 * RND (1)) + 1
200 ON W GOSUB 340,350,360,370,380
210 C = C + 1
220 PRINT : PRINT " PLEASE PRESS [RE-
    TURN]."
230 INPUT Z$: GOTO 70
240 REM SCORE AND AVERAGE
250 HOME : PRINT " HERE IS YOUR
    SCORE, ";N$;"."
260 PRINT : PRINT " ";C;" RIGHT."
270 PRINT : PRINT " ";10 - C;" WRONG."
280 P = (C / 10) * 100: REM P IS PERCENT
    CORRECT
290 PRINT : PRINT " TOTAL SCORE =
    ";P;"%"
300 PRINT : PRINT " DO YOU WANT TO
    TRY AGAIN (Y/N)?"
310 INPUT Z$: IF Z$ < > "N" AND Z$ < >
    "Y" THEN 310
320 IF Z$ = "Y" THEN RESTORE : GOTO
    10
330 PRINT : PRINT "THAT'S ALL,
    FOLKS...": END
340 PRINT : PRINT " GREAT!!": RETURN
350 PRINT : PRINT " THAT'S RIGHT!!":
    RETURN
360 PRINT : PRINT " TERRIFIC!": RE-
    TURN
370 PRINT : PRINT " CORRECT!": RE-
    TURN
380 PRINT : PRINT " GOOD WORK!": RE-
    TURN
390 DATA PLAY, PLAYES, PLAYS,
    PLAYZ,PLAYS
400 DATA BOX, BOXES, BOXS, BOXEZ,
    BOXES
410 DATA BUSH, BUSHS, BUSHIES,
    BUSHES,BUSHES
420 DATA CHURCH,CHURCHS,
    CHURCHES, CHURCHEZ,CHURCHES
430 DATA OPEN,OPENES, OPENS, OPEN
    SES,OPENS
440 DATA GARDEN,GARDENS,GAR
    DENES, GARDENIES,GARDENS
450 DATA GIRL,GIRLES,GIRLZ, GIRLS,
    GIRLS
460 DATA LOCK,LOCKS,LOCKES,LOCKZ,
    LOCKS
470 DATA FLY,FLYS,FLIES, FLYES,FLIES
480 DATA PIE,PIEES,PYES,PIES,PIES
490 DATA DONE,0,0,0,0
```

Edward Watson
Trenton, NJ

TYPING-TO-MUSIC GAME

You can use the idea behind the game Musical Chairs to have students practice their typing skills.

Select a record or tape of classical music, or the soundtrack to a popular movie, such as *Star Wars* or *Superman*, and play the music for two or three minutes. As the music plays, have students type the alphabet as many times into a computer as they can within that period. When the music stops, all typing must also stop.

Next, print out students' work, and have children circle the alphabet each time they managed to type it in full. Each completion of the alphabet is worth five points, but one point is subtracted for each typing mistake made. This forces students to shoot for accuracy, as well as speed.

Students may wish to play several rounds of this game. The student with the most points at the end of all the rounds wins.

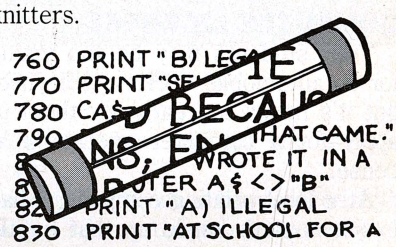
As a variation, have kids type the numbers 1 through 25 in numerical order, rather than 24 letters in alphabetical order.

Mary Ellen Switzer
Del Mar, CA

MAKE PROGRAM LISTINGS EASIER TO INPUT

Although I have always loved to use the program listings published in computer magazines, I used to dread inputting them. I kept losing my place while typing, and would end up typing the commands that belonged on one line onto another line.

A solution to this problem came to me at home one night while looking through a catalog of needlecraft supplies. In the catalog was an advertisement for a one-line magnifying lens, about six inches long by one inch wide, that had a small magnet attached to each end. Its actual purpose is to enlarge instructions for knitters.



I purchased one of these little items, and have found it an immense help when typing up new computer programs. If I lean a program listing against a magnetic or metal board (such as a music stand), I can then position the "magnetic" magnifier anywhere on a page that I want, and it won't move until I move it. The magnifier even has a horizontal red line running through it, which makes holding my place in a computer program listing even easier.

This kind of a magnifier can be picked up for a cost of about $5 at most craft stores, or at large department stores that have needlework departments.

Teresa Prather
Thomasboro, IL

SEND US YOUR MICRO IDEAS

Do you have computer activities, bulletin boards, or management tips you'd like to share? Send them to Micro Ideas, *Teaching and Computers,* 730 Broadway, New York, NY 10003. We'll pay $15 to $30 for each idea we publish, and $5 for each quick, one-sentence tip we use. ■

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b. ☐ Approve purchase
c. ☐ Both of the above

2. What is your primary involvement with Computer Software?
a. ☐ Identify need
b. ☐ Recommend program
c. ☐ Approve purchase
d. ☐ All of the above

3. Do you purchase computing products at:
a. ☐ Computer Retailer
b. ☐ Educational Dealer
c. ☐ Catalog
d. ☐ Mass merchandiser

4. Do you recommend to students and parents?
Yes ☐ No ☐

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31	32	33	34	35	36
37	38	39	40	41	42
43	44	45	46	47	48
49	50	51	52	53	54
55	56	57	58	59	60
61	62	63	64	65	66
67	68	69	70	71	72
73	74	75	76	77	78
79	80	81	82	83	84
85	86	87	88	89	90
91	92	93	94	95	96
97	98	99	100	101	102
103	104	105	106	107	108
109	110	111	112	113	114
115	116	117	118	119	120
121	122	123	124	125	126
127	128	129	130	131	132
133	134	135	136	137	138
139	140	141	142	143	144
145	146	147	148	149	150

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7 8 9 10 11 12
13 14 15 16 17 18
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31 32 33 34 35 36
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103 104 105 106 107 108
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127 128 129 130 131 132
133 134 135 136 137 138
139 140 141 142 143 144
145 146 147 148 149 150

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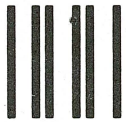

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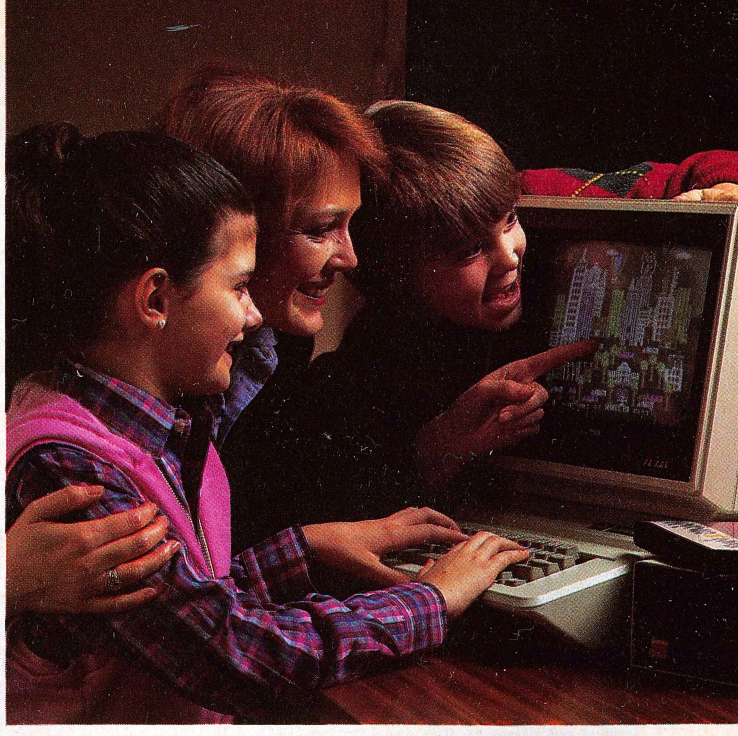

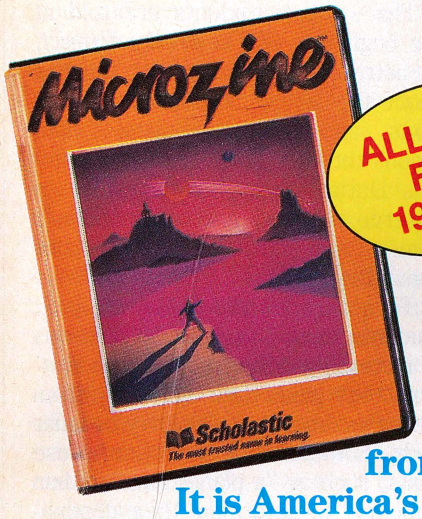

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SOFTWARE SHOWCASE

SOFTWARE RECOMMENDED FOR TEACHERS, BY TEACHERS

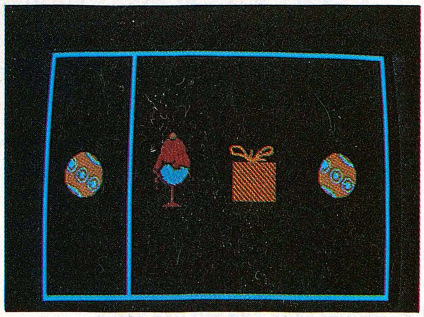
Young children will enjoy computer activities with Pockets the Kangaroo.

HAPPY BIRTHDAY, POCKETS!

Computer: IBM PCjr
Topic: Visual discrimination skills
Grade Level: Preschool – kindergarten

Pockets, the friendly kangaroo, is having a birthday party and your students are invited. At the party, children will have fun wrapping presents and playing games on the computer screen. The activities provide practice in identifying and matching shapes, numbers, and letters.

The program includes eight different activities. Two are free-play activities in which children use the keyboard to change the wrapping on a present. For example, pressing the "Z" key makes a bow appear on the present. Pressing it again changes the color of the bow.

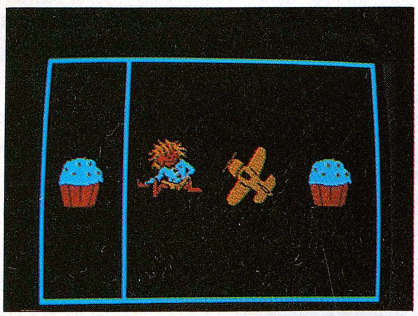


Which one matches?

The six structured activities involve matching shapes, numbers, and upper and lower case letters. For example, in one activity, Pockets brings a shape onto the screen. Players use the keyboard to select the shape at the bottom of the screen that matches Pockets' shape. In another activity, players match a party treat on the right side of the screen, such as a balloon or cupcake, with an identical object on the left side of the screen.

The activities are short, sweet, and to the point. They provide practice in visual discrimination skills, and provide a springboard for the related noncomputer activities included in the program's documentation.

The documentation provides adequate instructions for using the computer and the software. The suggested supplementary activities are good, but would be more helpful to a parent than to a teacher. (Most teachers have their own bag of tricks for teaching these skills in class!) There is also a summary card that is geared for adults.



Kids pick the matching treat.

Unlike most early learning software, the program activities in *Happy Birthday, Pockets!* are short, simple, easy-to-use, and appropriate to the abilities and attention span of preschool and kindergarten children.

Children are able to use the program independently. The musical rewards for correct responses are appropriate. They delight the children, but don't distract them from the task at hand. My young students were enthusiastic about the program. They especially liked Pockets, the kangaroo.

Price: $39.95
Policy: No backups; 30-day preview
Source: World Book, Inc., Merchandise Mart Plaza, Chicago, IL 60654; Call collect 216/642-3900

Barbara Devir, Teacher
Woodside School, Peekskill, NY

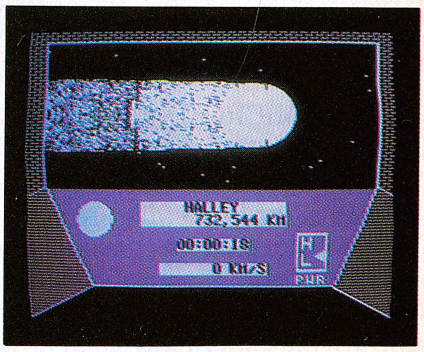
THE HALLEY PROJECT: A MISSION IN OUR SOLAR SYSTEM

Computer: Apple II series (joystick optional); Commodore 64,128; Atari (joystick required)
Topic: Science
Grade Level: 5 – 12

"Congratulations. You have been chosen from all the pilots in the solar system to compete for a spot on the Halley Project team."

That's what students are told at the beginning of *The Halley Project,* an astronomy program that teaches about the sizes, atmospheric conditions, and orbits of planets and moons through simulated space travels. During their travels, students observe eclipses, encounter Halley's comet, and learn to identify major constellations.

To qualify for the Halley Project, students must complete 10 missions of increasing difficulty. On each mission, they guide their spaceship from Halley's comet to a planetary or lunar body. Sometimes students must use clues, such as "a planet smaller than a moon," to determine their destination. *(The answer is either Mercury or Pluto.)*



Students must earn the right to join the Halley Project team.

The first destination is Earth. To reach it, students must estimate distances and determine their position in space in relation to planets, the sun, and the constellations. They navigate in space with the help of a radar screen and a star map that shows the zodiacal constellations.

Each planet or moon has two landing areas, one facing the sun, and one facing away from the sun. As in the

real universe, star and planet positions change. If pilots crash (more than one student can take the Halley's Project challenge at one time), their mission is delayed and a five-minute penalty is added to their time for that mission.

The program keeps track of progress and flight times for up to 32 students at a time. Once students complete the tenth mission and achieve the rank of Starbird, they fill out and send in the registration form that comes with the software. Students who send in the registration form receive special instructions for the eleventh mission, The Halley Project, in the mail.

The Halley Project comes with a teacher's manual that provides program information, suggestions for classroom use, related research projects, resource material, five reproducible student activity sheets, and answer keys. It also includes a technical reference guide, a star map, a flight instruction card, instructions for demonstrating the program, and an audiocassette that contains a mission briefing.

The program is very complete. It teaches students about astronomy and then allows them to use their new knowledge to solve problems. It's a natural supplement to fifth grade science units on planets, as well as junior high physical science units.

Price: $49.95; $125 for class pack of five disks
Policy: Backup included; 30-day preview
Source: Mindscape Inc., 3444 Dundee Road, Northbrook, IL 60062; 800/221-9884; 800/942-7315 in Illinois

Ann Dana, Computer Consultant
District 181, Hinsdale, IL

FIX IT

Computer: Commodore 64, Apple II series
Topic: Problem solving
Grade Level: 3 – 12

You could say *Fix It* is a collection of brain teasers. Or, you could call it a construction set for the mind. However you describe it, *Fix It* is a fun game that encourages creative thinking and problem solving.

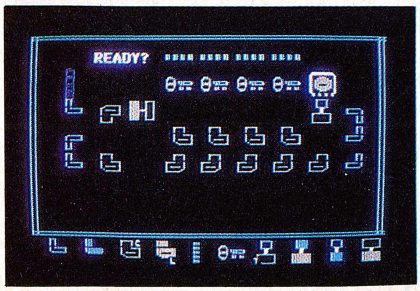
Players start with a kit (a disassembled machine) that needs to be assembled. Each "kit" contains a variety of parts with different characteristics. To start with, all kits have a wrench that "holds" a small, hollow bolt.

The game's objective is to make the bolt leave the wrench, move across the screen, and enter an on-screen box. Players use an assortment of "spare parts" to build a machine that will accomplish this. The parts needed to build the machine are presented at the bottom of the screen.

Aside from moving the bolt in various directions, the spare parts can change the properties of the bolt. To enter the box, the moving bolt must match the properties of a "target" bolt, which appears inside the box. Depending on the game, the target bolt may be small and hollow, large and hollow, small and solid, or large and solid.

There are four kinds of spare parts: elbows, converters, bouncers, and keys. Each part has a different function. Elbows change the direction of moving bolts. One elbow changes the direction of small, solid bolts; another changes the direction of large, hollow bolts. Converters change the properties of moving bolts. One converter changes hollow bolts from large to small or from small to large; another changes small bolts from hollow to solid or from solid to hollow. Bouncers make moving bolts rebound in the opposite direction and keys open locked boxes.

Players use a mouse, joystick, or keyboard to select spare parts and arrange them on the screen. Once



Fix It *challenges the mind.*

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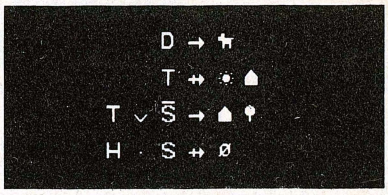

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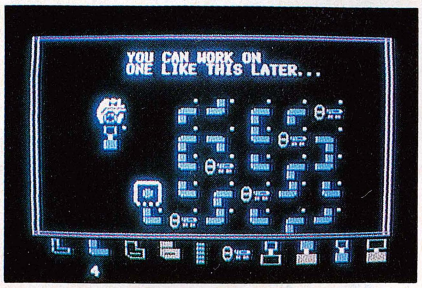
the parts are arranged, players can test the machine to see if it works and modify it if it doesn't.

The game includes 200 kits; each one is progressively more difficult to assemble than the last. In kits 101 to 200, the parts used to build machines can change their properties. For example, a small hollow elbow can become a small solid elbow after the bolt passes through it.



Each new kit becomes more complex.

Students can choose which kit they want to fix, or they can build their own kits and challenge classmates to fix them. The program saves up to 100 kits. Players can save the kit they are working on or the kits they design.

Another option allows players to compete against themselves or each other by using an on-screen timer. This feature greatly enhances the appeal of the game when used in a classroom.

Fix It challenges students to use inductive and deductive reasoning and hypothesis testing. The program is designed well. Its documentation is adequate.

Price: $29.95 for Commodore; $39.95 for Apple
Policy: $9.95 backup; 30-day preview with purchase order
Source: Random House Software, 201 East 50 Street, New York, NY 10022; 800/638-6460; In Maryland, call 800/492-0782

Michael Rand, Computer Consultant
Teacher's College, New York, NY

DUNGEON DOOM TYPING GAME

Computer: TRS-80 Models III,4; Apple II series; Commodore 64,128
Topic: Typing
Grade Level: 5 – 12

You are lost in the Dungeon of Doom and the walls are closing in. To escape, you must type a set number of words correctly in one minute. If you fail, the dungeon walls close in on you. That's how you play *Dungeon Doom*, a game that provides intensive one-minute speed practice for typists of all levels.

Players are asked to choose from five different lessons: One drills home row keys, others drill the top row, bottom row, upper case, and full keyboard. In each lesson, players select a words-per-minute typing goal, from one to 120. A word appears in each of two top windows on the screen. When players type the word correctly, they hear a positive reinforcing sound and a new word appears in its place.

While players type, a graphic shows the walls of the dungeon gradually moving inward. If players meet their goal, the program immediately stops. If they fail, the dungeon walls close in and the game ends.

After each game, players receive data, such as number of words typed correctly, seconds used, average number of words typed per minute, and final score. Records of up to 200 games can be stored on the program disk and printed in a variety of ways.

Dungeon Doom is a practice game, not a typing tutorial. It assumes that keyboard instruction has already taken place.

I like the program's brisk pace. It allows kids to get significant typing practice in a five-minute block. The practice also serves as a spelling drill because students must type actual words rather than a series of meaningless letters. This makes *Dungeon Doom* a more viable educational tool than other typing programs on the market.

The documentation is well written and adequately outlines the program's format. The disk and documentation are protectively enclosed in a slender, easy-to-store binder.

Dungeon Doom is definitely the best typing program I've seen for the TRS-80.

Price: $39.95
Policy: $15 backup; 30-day preview
Source: Gamco Industries, Inc., Box 1911, Big Spring, TX 79721; 800/351-1404

Craig Dickinson, Teacher
Asa Adams School, Orono, ME

WORD QUEST

Computer: Apple II series
Topic: Language arts
Grade Level: 3 – 9

Word Quest consists of two related language games called "What's The Word?" and "Word Chain." Both games challenge students to increase their vocabulary and improve dictionary skills.

"What's The Word?" is a game for two or more players. One player or team secretly types a word into the computer. The other player or team uses alphabetical and vocabulary knowledge to guess the secret word.

At the beginning of the game, the computer informs the opposing players that the word they are searching for lies between two words: "a" and "zymurgy." Players type a word that would appear between those two words in a dictionary, such as "paper." If that is not the secret word, the program gives another hint by putting the word "paper," in place of either "a" or "zymurgy," depending on where the secret word falls in the alphabet. For example, if the secret word is "frog," the program then asks for a word between "a" and "paper." The goal is to narrow the interval as quickly as possible to zero in on the secret word.

The most efficient strategy for playing this game is to guess a word as close as possible to the middle of each alphabetical interval each time. This strategy of "halving" the remaining possibilities is a powerful search strategy known in mathematics as a *binary search*.

In "Word Chain," the second game on the disk, one or more students challenge themselves or each other to find words that fit into a "word chain." The object is to make your word chain as long as possible.

To make a word chain, players type two words into the computer, such as "abstract" and "zebra." Then they enter a word that lies alphabeti-

cally between the two words, such as "rice." From these three words, the computer chooses the two words that are closest together in the alphabet, in this case "rice" and "zebra." Now the students must find a word that appears within the new alphabetical interval. As the gap between words narrows, the game becomes more difficult.

In both games, students can press the "?" key at any time to see the words they have entered so far. At the end of "What's The Word?" players are told how many tries they used. In "Word Chain," the computer reports the number of links in their chain.

The manual describes the program and explains how to help students choose words. It also provides suggestions for integrating the program into the curriculum.

My students enjoyed challenging their classmates to guess words in "What's The Word?" When used with pairs or small groups of children, both programs encourage students to work together.

Because the users supply all the program's vocabulary, it can be played using French, Spanish, Italian, German, and other languages that use the Latin alphabet. Teachers of second and third grade students may want to use the program with specific vocabulary units, such as words from a social studies or reading unit.

Price: $59
Policy: Backup included; 30-day preview
Source: Sunburst Communications, 39 Washington Avenue, Pleasantville, NY 10570; 800/431-1934

Ann Dana, Computer Consultant
District 181, Hinsdale, IL

MECC DATAQUEST: THE PRESIDENTS

Computer: Apple II series
Topic: Social studies
Grade Level: 4 – 12

What major decisions did Abraham Lincoln have to make? Which presidents won the popular vote by the largest margins, and did that have any effect on their actions in office?

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(continued from page 57)

MECC Dataquest: The Presidents helps your students find answers to these questions and more by searching through a computer data base that contains information about all 40 American presidents. The program is designed to spark student interest about the executive office and to provide practice in using a data base as an investigative tool.

The data base consists of a record on each president that contains a variety of information: dates of his term(s) in office, former occupations, political party associations, names of his vice-president(s); as well as key legislation, historical events, and major presidential decisions he was involved with.

Students access information from the data base by making selections from a series of onscreen menus. The PRESIDENTS menu lists the presidents in the order in which they served. The SEARCH menu lists 18 categories, including POLITICAL PARTY, TERMS IN OFFICE, and CONSTITUTIONAL AMENDMENTS, that students use to find information in the data base. Many of these categories have more specific submenus. For example, the submenu for TERMS IN OFFICE includes LESS THAN ONE TERM, ONE FULL TERM, BETWEEN ONE AND TWO TERMS, TWO FULL TERMS, and MORE THAN TWO TERMS. The REPORT menu lists the 23 categories that students use to specify what information about the presidents they want to see in a report (such as the names of the presidents' vice-presidents or their election results).

For example, if students want to find the political parties of George Washington and Franklin Roosevelt, they choose those presidents' names from the PRESIDENTS menu. Then they choose the category, POLITICAL PARTY, from the REPORT menu. Then students are asked if they want to see, print, or save the report.

If students want to find the presidents that served less than one term in office, they choose the TERMS IN OFFICE category from the SEARCH menu. That takes them to a submenu from which they choose LESS THAN ONE TERM. The computer searches for all the presidents who served less than one term in office. From there, students proceed to the REPORT menu where they choose which information about these presidents should appear in their report. For example, their report may contain the names of each president, his vice-president's name, and the election results. Again, they have the option to see, print, or save the report.

Not only does the program allow students to collect simple facts; it encourages them to ask questions about the presidents and the events of their administrations, make historical comparisons among presidents, develop hypotheses about presidents and their administrations, and test their hypotheses. Using the data base, students research questions they develop, find answers, and draw conclusions based on their findings.

The easy-to-use program provides an excellent introduction to data base use for students without experience. The excellent documentation provides thorough operating instructions as well as extensive instructional suggestions with accompanying blackline masters for students.

The program's only weakness is its limited search capacity. Unlike more sophisticated data bases, the program can't implement a search that combines criteria with the word "or." For example, to deal with the question, "Who are all the presidents who were either born in Virginia or resided in Massachusetts?," a student would have to conduct two separate searches and then compare the two reports that resulted.

MECC Dataquest: The Presidents allows social studies teachers who have very little computer experience to use the computer as a tool with their classes.

Price: $49
Policy: Backup included; 30-day preview
Source: Minnesota Educational Computing Corporation, 3490 Lexington Avenue North, Saint Paul, MN 55126; 612/481-3527

Pamela Hale, Computer Coordinator
East Ramapo Central School District
Spring Valley, NY ■

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CONVERSION CHART

HOW TO CONVERT T & C *PROGRAMS TO OTHER MACHINES*

The *Whaling Away* program on page 19 is written for the Apple II series of computers. Use this chart to adapt the program for Commodore 64 and TRS-80 computers. For more information on how to use specific commands, refer to your user's manual.

***WHALING AWAY,* page 19**

Commodore 64

1. Change HOME to PRINT CHR$(147) in lines 20, 280, 340, 400, 560, 3070, 6010, and 7010.

2. Substitute the following lines for corresponding lines in the Apple program listing.

```
20 PRINT CHR$(147):CLR
660 IF MO > 12 THEN MO = 1:YR = YR + 1:PRINT "PRESS
  RETURN.":INPUT Z$
1020 IF CASH(V) < PP THEN PRINT "YOU'RE BROKE!
  PRESS RETURN.":INPUT Z$:RETURN
1150 IF B$ = "2" AND NB(V) > 5 THEN GOSUB 2800:GOTO
  1010
3110 FOR D = 1 TO 500:NEXT D
3140 IF K = 1 THEN GOSUB 3300:GOTO 3190
3200 IF T < 28 THEN GOSUB 3400:IF A$ = "N" OR A$ = "NO"
  THEN 3220
```

3. Add the following lines.

```
2800 REM NO MORE BOATS
2810 PRINT:PRINT " YOU HAVE ENOUGH BOATS! PRESS
  RETURN."
2820 INPUT Z$
2830 RETURN
3300 REM BOAT DESTROYED
3310 PRINT:PRINT " ALAS, A BOAT WAS DESTROYED IN
  THE CHASE"
3320 PRINT "AND THE WHALE ESCAPED."
3330 NB(V) = NB(V)-1
3340 RETURN
3400 REM KEEP HUNTING?
3410 PRINT:PRINT " DO YOU WANT TO KEEP HUNTING
  (Y/N)?"
3420 INPUT A$
3430 RETURN
```

TRS-80 Models III, 4 and Color Computer

1. Change HOME to CLS in lines 20, 280, 340, 400, 560, 3070, 6010, and 7010.

2. Change "PRESS RETURN" to "PRESS ENTER" in lines 360, 420, 660, 680, 1020, 1080, 1150, 2060, 2540, 2640, 2740, 3250, 4080, 4640, and 7150.

3. Substitute the following lines for corresponding lines in the Apple program listing.

```
20 CLS:CLEAR 2000
3050 IF RND(100)/100 > FN P(NW(VL(V))) THEN 3210
3110 FOR D = 1 TO 500:NEXT D
3120 K = 0:FOR I = 1 TO NB(V):IF RND(100) < 3 THEN K = 1
3150 IF RND(100)/100 < FN C(NB(V)) THEN 3170
5130 IF RND(100)/100 < WB THEN NW(I) = NW(I) + 1
```

CORRECTION: *"Mr. Turtle Goes to Kindergarten"*

In the feature article "Mr. Turtle Goes to Kindergarten" (January 1986), the developer of Apple Logo should have been identified as Logo Computer Systems, Inc. and the developer of Commodore, Krell, and Terrapin Logo should have been identified as the Massachusetts Institute of Technology.

ANSWERS TO "MICRO TIMES"

More Milk, Fewer Cows

Here are answers to the review questions.

(1) No (less), the same; (2) The collars have computer ID numbers that identify the cow during feeding and milking; (3) They only put food in the bin if the cow has not yet eaten her quota; (4) The computer checks if the cow is taking medication; (5) They control how much the cows eat (eating is directly related to milk production), they help detect illnesses early so that the herd stays healthier, they reward cows for producing a lot of milk, and they provide the farmer with detailed records of each cow so that he or she can care for them more efficiently.

Bug Busters

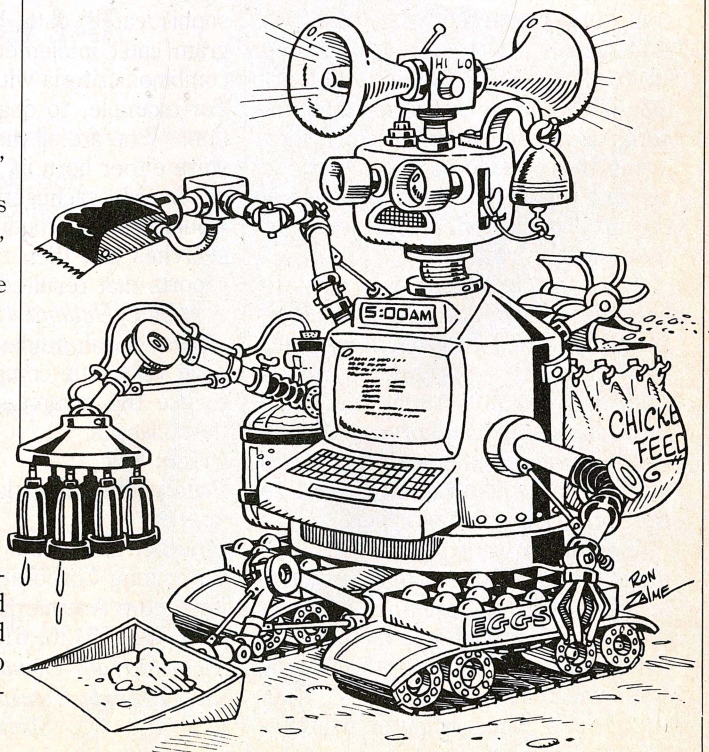
Here is the corrected *Clover* program.

```
TO CLOVER
  HT FD 40 LT 45
  REPEAT 4 [LEAF LT 90]
END

TO LEAF
  REPEAT 36 [FD 2 RT 10]
END
```

Farmer's Helper

Here is a finished robot design for the farmer's helper robot. Students' designs will vary.



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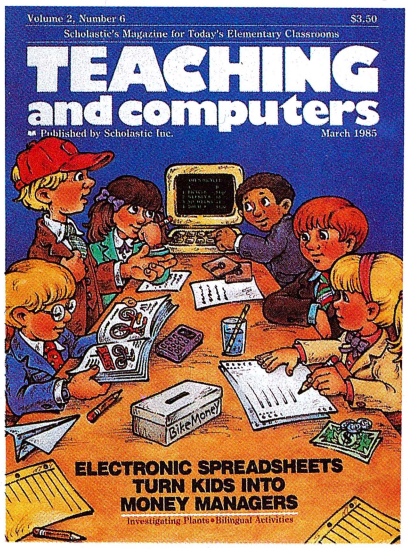

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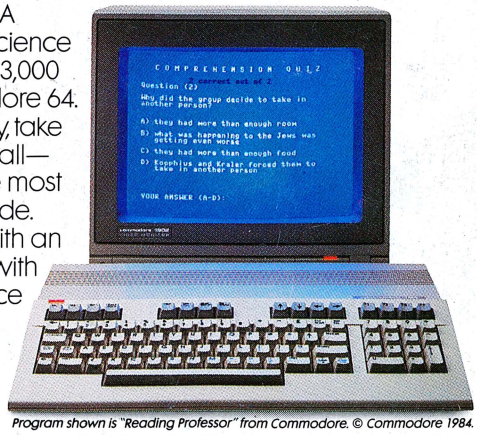

Program shown is "Reading Professor" from Commodore. © Commodore 1984.

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